



FRIDAY, SEPTEMBER 19, 1902.

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Contributions

The Engineer at the St. Louis Fair.

St. Louis, Sept. 2, 1902.

TO THE EDITOR OF THE RAILROAD GAZETTE:

The agitation in engineering societies as to the propriety of a code of ethics to govern the members of our profession, is evidence of a desire to ennoble the calling of the engineer. None of the so-called learned professions is so intimately connected with the material progress of our country as is that of engineering. Yet, in the face of all this, the profession is not held in that high esteem to which it is justly entitled. This is due, in a great measure, to the fact that the public is not as familiar as it should be with the functions of the engineer, whose individuality is more or less overshadowed by the great corporation which employs him.

Much can be done at great expositions, by bringing the general public into contact with the work which the engineer has wrought and which emphasizes his science, ingenuity and skill. Heretofore, engineering work at expositions has been somewhat obscured by being mixed up with transportation and other related matters which indeed are closely akin to it. In the coming exposition at St. Louis, civil, military and architectural engineering pertaining to public works, will be housed together in the Liberal Arts Palace.

In the interests of the profession, as well as those of the Exposition, I hope to secure for the several groups devoted to engineering, the best examples of what the engineer has wrought in all parts of the world. With the proper co-operation of the engineering profession, which should be readily accorded, there would be gathered at the coming exposition the greatest engineering exhibit which the world has ever known. Every engineer can do something toward the realization of this much-desired result.

J. A. OCKERSON, M. Am. Soc. C. E.,
Chief, Department of Liberal Arts.

Railroad Men and Railroad Finance, Here and in England.

Washington, Sept. 9, 1902.

TO THE EDITOR OF THE RAILROAD GAZETTE:

With reference to article, entitled "English and American Railroad Employees" in your issue of 5th inst., a very effective way to lessen the number of accidents would be, of course, to hasten on by every possible means, using every available source of revenue for it, the double tracking of our roads. The aim must always be to eliminate the human elements of frailty and forgetfulness from railroad operations, and what better step could we take in that direction than in rapidly reducing the number of miles of track used in both directions? Of course, progress is being made in this direction, but how much faster might be the progression if all the money used at the present time to pay interest on bonds and stocks for which no value has been given were put into the properties?

I am inclined to agree with the view that one of the

main causes of the comparative immunity of British roads from accidents is the much larger number of trained men permanently employed in all branches of the service. There is a startling disparity between the United Kingdom and America in the total number of employees per mile of road. In America for year ended June 30, 1901, it was 5.48; in United Kingdom, 24.54. Of those employees in Conducting Transportation Department the comparison per 100 miles of road is approximately as follows:

	United Kingdom.	America.
Enginemen	101	23
Firemen	99	23
Trainmen	137	55
All others	460	136
	797	237

It is probable that the British roads include certain classes of men, such as carters or draymen, in their total, while we do not. It is also certain that they have a chance to effect some of their desired economies in increasing the size of their power and so reduce the number of their engine, fire and trainmen; but, after all said and done, it looks as if our roads were undermanned judged by European standards, and the extension of the block system which you advocate would be one means of reducing the disparity.

But, then, crops out the question of wages, and the American railroad proprietor turns and says "Yes, more men, but where find the money to pay them when they all insist on such high wages." Very true; it is difficult to make ends meet, but is the problem made any easier by appropriating to the bond and stockholders what one may term the "unearned increment" in the value of the properties?

How many roads are there in the country that adopt the wise and, above all, the just method of distributing this unearned increment that the Pennsylvania Railroad Company adopted when it recently increased its capital stock? The unearned increment of \$10 a share was taken from the pocket of the shareholder and put into the property for the ultimate benefit of the public, the shareholder and the employee. Contrast this with the operation of the Jersey Central turned over to the Reading, the manipulation of C. B. & Q., and now the unblushing effrontery of the C. R. I. & P. "reorganization."

Sir, I am one of those old-timers who believe that moral causes rule the world's affairs and that only by the observance of decent public morality can a country be held steady on its foundations, and I ask, in all soberness, if we are exhibiting decent morals in putting out so much water when accidents are daily happening and lives being sacrificed for lack of double tracks and adequate protective service?

Furthermore, we may rest assured that the native born working masses of this country are not unlettered fools. Many of them are readers and thinkers, and when the time comes, as it must come sooner or later, that the railroads shall seek to carry their burden of water by reducing the number of men employed, thereby endangering the efficiency of the train service, or by cutting down wages, they will know enough to put their fingers on the sore spot and decline to have the healing done at their expense. Let those who to-day are revelling in the possession of millions of railroad securities, for which they paid not one cent, take heed that they have not sown the wind to reap the whirlwind.

Whatever may be said about the capitalization of British roads, the sum total represents actual money spent on them, and that is probably another main reason why accidents are fewer there than here.

I am encouraged to write you this letter in that the President is giving us all a good lead on matters akin to those here treated of, and if one may believe current talk, he is incurring the serious enmity of some of the financial centers in doing so. I believe the President is playing a high-minded, patriotic part, and you, sir, appealing as you do in your columns more to the intellectual than the money-making portion of the community, may be of the same mind and may not think it inadvisable to give this letter place in your columns.

I must add, as a last word, that my remarks are intended to bear on railroad financing exclusively.

OBSERVER.

Rules for Using the Train Staff.

[Extracts from the Rules of the London & North Western Railway for Working Single Track Railroads by Train Staff and Ticket. The train staff is a billet of wood about 22 in. long. It has metal trimmings and is lettered with the names of the stations between which it is used.]

A Train Staff or Train Ticket must be carried with each train, and no train must be permitted to leave any Staff Station with a Train Staff Ticket, unless the Staff for that portion of the Line over which it is to travel is then at the Station.

No train must shunt for another train to pass except at a Train Staff Station.

The person in charge of the Staff Working [at a station] for the time being is the sole person authorized to receive and deliver the Staff or Ticket.

When a train is ready to start from a Station and no second train is intended to follow before the Staff will be required for a train in the opposite direction, the person in charge of the Staff Working must give the Staff to the Engine Driver, who will then place it in the Train Staff socket, where provided, on the engine.

If other trains are intended to follow in succession before the Staff can be returned, a Ticket indicating that the Staff is following must be given by the person in charge of the Staff Working to the Engine-driver of the first train, the Staff for the Section being shown to him, and so on with any other train except the last, the Staff itself being given to the Engine-driver of the last train, as directed in the preceding Rule. The person who hands the Ticket to the Engine-driver must satisfy himself that the train has gone with such Ticket before, he allows another train to follow. After the Staff has been sent away no other train must, under any circumstances, leave the Station to follow in the same direction until the Staff for that Section has been returned.

The Station-master or person in charge of the Staff Working must consider it his first duty to deal with the Train Staff or Ticket on arrival of the Train, and at Crossing places must satisfy himself that the train, running in the one direction has arrived complete, with the Tail Lamp on the last vehicle, before handing over the Staff or Ticket to the Engine-driver about to travel in the opposite direction.

No train must be permitted to leave a Station until the Engine-driver has received the proper Staff or Ticket for that Section of the Line over which he is about to travel, and he must not take the Staff or Ticket from any other than the person in charge of the Staff Working for the time being. . . . He must be careful not to take the Staff or Ticket beyond the Staff Station at which it should be left. . . .

Each Staff has engraved or marked on it the name of the Staff Station at each end of the Section to which only it applies. The Staffs, Boxes and Tickets for the different Sections are painted and printed in different colors, and the Staffs of adjoining Sections are different in shape. . . .

In the event of an engine which carries the Staff breaking down between two Stations, the Fireman must take the Staff to the Staff Station in the direction whence assistance can be obtained or is expected, in order that the Staff may be at the Station on arrival of the relieving engine. . . . Should the engine that fails be in possession of a Ticket instead of the Staff, assistance must only come from the Station at which the Staff has been left. . . .

When a Ballast train has to work on the Line, the Staff must be given to the Engine-driver in charge of it. This will close the Line whilst the Ballast train is at work. . . .

Points giving communication between the Sidings and the Running Line controlled by the Train Staff cannot be opened without the Train Staff for that section, and the Train Staff cannot be removed until the Points have been placed in the proper position for trains to pass upon the Running Line. . . .

Some Notes on Piston Valves.*

Now that piston valves are attracting so much attention, and many locomotives are being equipped with them, it may be of interest to call attention to some peculiarities inherent to certain types, and especially to that of the solid design with internal admission.

The following types are to be found on simple engines: (1) The solid form with external admission and internal exhaust. (2) The hollow form with internal admission and external exhaust. (3) The solid form with internal admission and external exhaust.

The first (solid external admission) has very much the same action as the slide valve, but some designers object to it because it requires the live steam passage in the saddle to be divided with a separate branch leading to each end of the valve chamber, thereby bringing the live steam in contact with the more exposed parts of the cylinder with resulting condensation.

The second (hollow admission) has the internal admission and exhausts at the ends, but has in addition a hollow center which permits the exhaust at either end to circulate freely and instantly from one end to the other. It is objected to by some designers on the ground that the live steam is jacketed with the cooler exhaust steam in the hollow center of the valve resulting in condensation.

The third (solid internal admission) also has the internal admission, but is without the hollow center, thereby preventing the exhaust at either end from circulating back and forth except in the roundabout way through the cylinder saddle and back to the opposite end of the valve chamber. This takes some time to do, and, therefore, causes an unequal pressure on the opposite ends of the valve which is greatest with the following combined conditions: slow speed, full throttle, maximum cut-off, and at the moment exhaust opening occurs. The extent of this unbalanced pressure does not seem to be generally appreciated.

Indicator diagrams taken from the cylinder and the valve chamber of a consolidation locomotive show a pressure of 54 lbs. on the end of the valve exhausting, and but 2½ lbs. at the opposite end at the same moment. The diameter of the valve is 11 in. and the unbalanced load on one end due to this pressure amounts to 4,960 lbs. The suddenness with which this load is applied is indicated by an almost perpendicular rise on the diagram near the ends. The unbalanced load on the end of the

*Presented at the September meeting of the Richmond Railroad Club by Mr. F. A. Houghton, Supt. of the Richmond Locomotive Works.

valve acts in the same direction in which it is moving, and takes up all the lost motion in valve gear from the valve to the eccentrics with a sudden shock, the extent of which depends on the degree of lost motion, but which is apparent on any engine equipped with this form of piston valve.

Up to the time of writing diagrams from the other types of valves mentioned are not available, nor are diagrams at the higher speeds. It is hoped, however, that at some future meeting the writer will be in a position to contribute further data on this interesting subject.

Michigan Central Shop Improvements at Jackson, Mich.

In presenting a description of the improvements that the Michigan Central is making in its shops at Jackson, Mich., at the present time it is interesting to refer back to an article describing these shops published in

hand-fired. The coal is stored in the bin shown along the south wall, there being a coal track along the outside of the building, and is drawn out on the floor through openings at the bottom of the bin. The plant is equipped with an induced-draft system, the draft being maintained by one of a duplicate set of fans built by the B. F. Sturtevant Co., and driven by independent engines controlled by a G. M. Davis fan-regulating valve. The breeching is built of $\frac{1}{2}$ -in. steel, with angle-iron stiffeners. A Green fuel economizer, having 2,400 sq. ft. capacity, and a Warren-Webster heater rated at 1,200 h.p. heat the feed water, which is supplied to the boilers by two Worthington duplex, $7\frac{1}{2} \times 4\frac{1}{2} \times 10$ -in. pumps, having outside valves. The economizer has capacity sufficient for the additional boiler above mentioned.

The engine room has three units for light and power. The engines, made by the Ball Engineering Co., are run compound, non-condensing. Two of them are 16 and 25 x 18 in., and the third 10 and 16 x 14 in. The two

The old air compressor has been installed in the new station temporarily, it being the intention to replace it in the near future with a larger machine of modern type. At the time of the previous description of these shops, referred to in the beginning of this article, this compressor had but recently been installed and was described at some length. It is a Rand two-stage machine, with inter-cooler, having 10 x 16-in. steam cylinders and $7\frac{1}{2}$ and 14 x 16-in. air cylinders. The delivery pressure is 120 lbs.

A $7\frac{1}{2}$ -ton hand-power crane having a span of 37 ft. 6 in., and a travel of the length of the room, facilitates handling the parts of the machines in case of repairs.

The steam piping is provided throughout with extra heavy fittings and Chapman valves. Connection to the 10-in. live-steam header from the boiler outlets is made with 8-in. long-sweep bends. From the header the steam passes through gate valves, steam separators and long-sweep bends to the engine throttles. An auxiliary high-pressure header, 3-in. in diameter and running above the middle of the battery, is so connected as to enable steam to be drawn from any single boiler to operate all of the auxiliary apparatus in the boiler room. Also a 4-in. line is run from the main header to the blacksmith shop for the steam hammers. The exhaust steam from the engines is led to a main-exhaust header located in a tunnel extending the entire length of the building and back of the engines. A 14-in. connection is made from this header through a branch tunnel into the boiler room, where connection is made to the feed-water heater and through a back-pressure valve to the exhaust head above the roof. Wherever possible the piping, with the exception of the main steam header and connections, is carried underground. The steam piping is covered with asbestos sponge-felt covering made by the H. W. Johns Mfg. Co.

Distribution.—The distribution of current for power and lighting is on overhead conductors except where the circuits lead out from the power station; lead-covered wires pass out from the pit behind the switchboard, already referred to, in underground conduits to poles a short distance away. It has been mentioned that there are 5 power circuits. One of these supplies the machine-tool motors in the locomotive and tender shop; another is for the operation of the cranes in the locomotive shop; a third supplies the motors in the carpenter shop, dry kiln and wood mill; a fourth, the transfer tables and turntables; while the fifth runs to the blacksmith shop and to the motor operating the coal chute. Three of the lighting feeders supply each a group of transformers, one of which is west of the roundhouse, a second west of the machine shop, and the third at the east end of the locomotive shop. The secondaries from these groups are interconnected. The fourth feeder supplies the passenger station, freight house and yards at Jackson with light. For this transmission of about a mile the current is transformed up to 2,200 volts at the power station and a pole line along the right of way of the company carries it to the points mentioned.

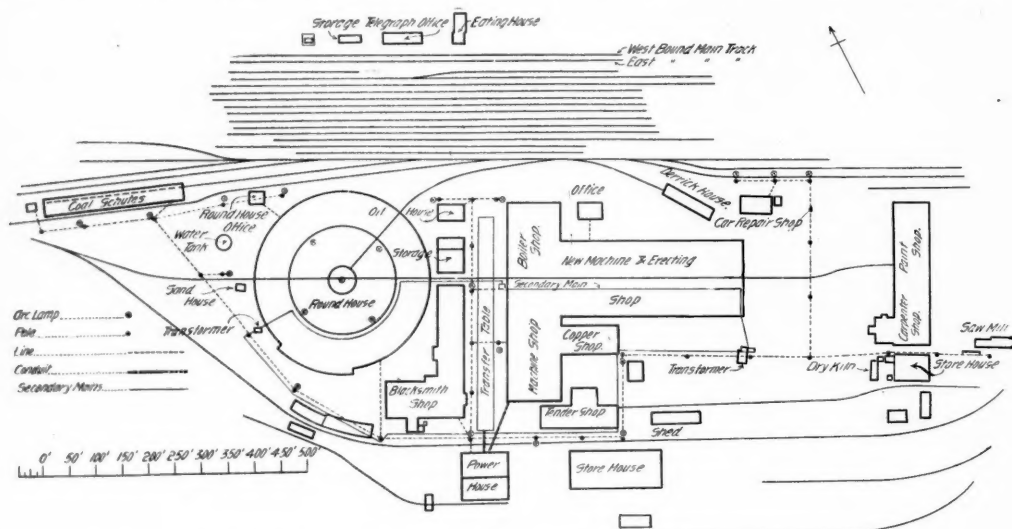


Fig. 1.—General Plan of Michigan Central Shops, Jackson, Mich.

the *Railroad Gazette* of April 23, 1897, from which an excellent idea may be obtained of the conditions and facilities then existing. It also serves to indicate the great difference existing between former and present-day practice in the design of railroad shop plants.

The extent of the present improvements, together with a brief outline of their nature, was given in our issue of Feb. 7, page 92. The old shop plant had four independent power plants, adjoining the machine shop, blacksmith shop, carpenter shop and roundhouse respectively. The new work consists in the elimination of these isolated plants by a new central power and lighting station, and the building of a large addition to the machine and erecting shop. In the plan of the shops which accompanied the 1897 article the blacksmith and boiler shops are shown as being in the same building, the one at present occupied by the blacksmith shop. By the new arrangement (Fig. 1) the boiler shop will be in the main building convenient to the machine and erecting departments.

The work at present under way is entirely under the supervision of Mr. C. H. Wilmerding, Consulting Engineer, Chicago. He has charge of the erection of the buildings as well as the rearrangement of the tools and the installation of the power, lighting and heating equipment from plans prepared by him.

Buildings.—The addition to the machine and erecting shop is at right angles to the old shop, and is carried through the latter to its east wall. It is of all-steel construction, having a central portion with a lean-to on each side. A half transverse section showing the construction of the building and location of machines is given in Fig. 2. The roof of each lean-to, as well as of the main or central part, is supported by steel columns, which in the case of the former are bricked into the walls. The width between columns of the central part is 72 ft. and each lean-to is 33 ft. wide, giving a total width of 138 ft. inside. The length of the new structure is 420 ft. The main columns carry the girders for two 60-ton cranes made by the Whiting Foundry Equipment Co., Harvey, Ill., which travel the full length of the building. The building foundations are concrete and the roof of the main portion is Ludowici tile, and the roofs of the lean-tos are expanded metal and concrete. The flooring of the central portion between crane columns is 2-in. yellow pine on 6 x 4-in. stringers; the remainder, from crane columns to walls, is floored with 6-in. cinder concrete. The power-house, 85 x 90 ft., is similar in construction to the main building. The roof is expanded metal and concrete on steel girders, and the floor is 6-in. cinder concrete. A monitor for ventilation of the boiler room runs along the crest of the roof; the engine room is ventilated by Pancoast ventilators.

Power Station.—A plan and elevation of the power station is shown in Fig. 3. Three Babcock and Wilcox boilers having each 2,640 sq. ft. of heating surface will furnish steam at 155 lbs. pressure, giving 150 lbs. at the engine throttles. Space is provided for a fourth boiler should future needs require it. Each boiler is equipped with a Green Engineering Co.'s chain grate, and will be

larger are direct-connected to General Electric 200-k.w., 60 cycle, three-phase generators giving 480 volts, and the smaller engine to a 75-k.w. generator of the same type. Each generator is provided with a compensating exciter, direct-gear to the shaft of the engine. The engines are also provided with synchronizing devices by which the speed of the engines may be brought into step.

The cables leading from the generators to the switchboard are carried in a trench, shown in the plan view,

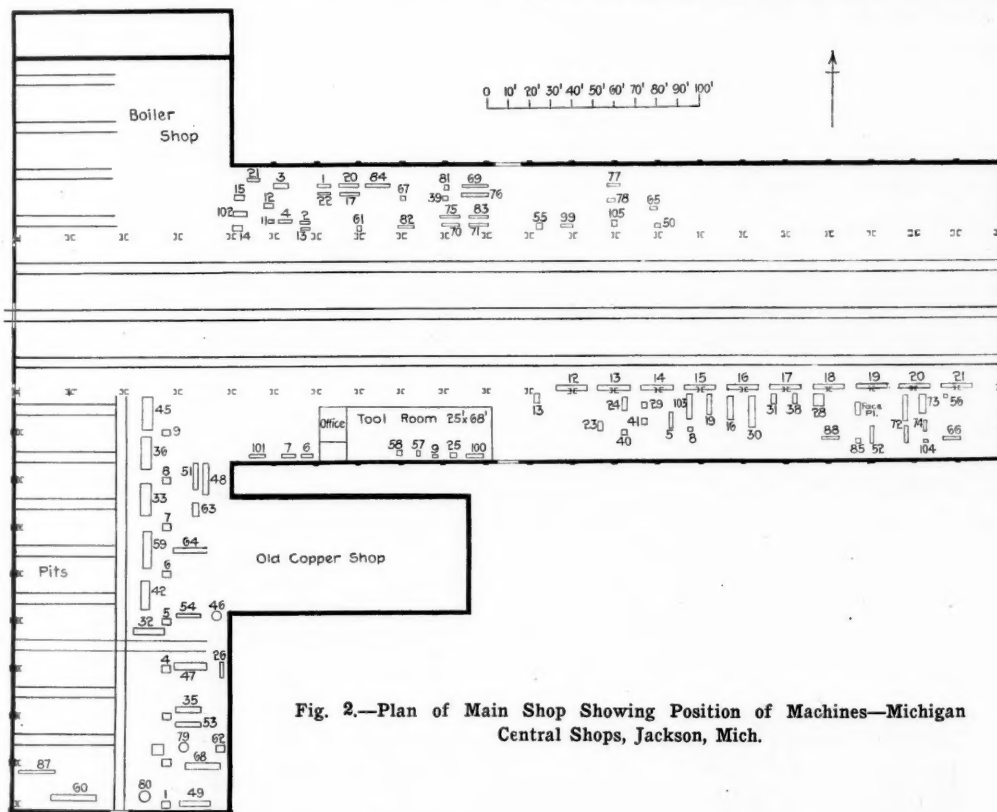


Fig. 2.—Plan of Main Shop Showing Position of Machines—Michigan Central Shops, Jackson, Mich.

under the floor to a pit behind the switchboard. This switchboard has eight panels and is built of 2-in. blue Vermont marble. The panels are apportioned as follows: Three for control of the generators; three for power feeders, governing 5 power circuits; and two for regulation of the lighting circuits, there being 2 to each panel. Two sets of bus-bars, one each for lighting and power are provided. Oil switches and recording wattmeters are included among the instruments, there being 2 of the latter, one for registering the power load and the other for the lighting load.

Locomotive Shop.—The old shop building is 375 ft. long by 103 ft. wide. The dimensions of the new portion have been given. The new shop has three longitudinal erecting pits, placed in the central portion. Those on each side of the center track are 350 ft. long, and a shorter one, in the center track, is 200 ft. long. Between the long erecting pits and the center track are two storage pits each 350 ft. long. These pits are intended to store the parts of the locomotives not needing repairs, and do away with racks and other arrangements that occupy needed floor space. The storage pits are provided

with removable sectional covers, resting on 4-in. I-beams spaced 6-ft. centers. The sides and bottoms of all of the pits are lined with cement, and in the bottom of the storage pits a 2-in. wooden flooring is spiked to 4 x4-in. sleepers imbedded in the cement. Sections of both pits are shown in Fig. 4. The new part of the shop will have a capacity for 14 locomotives a month, making the total for the entire shop about 24 a month.

In the new section all tools are located in the lean-tos. The old shop was very crowded, so that the rearrangement is simply a distribution of the tools already on hand over a greater territory, without the addition of any new tools. A few of the largest of these machines will be independent motor-driven. In the plans the rest are divided into groups, each group having a separate line-shaft and motor. These motors range from 5 to 30 h.p., while the independent motors range from 3 to 7½ h.p. As

alternating - current motors run at a high speed, a considerable reduction to the tools is necessary. A single reduction by belting and pulleys requires driven pulleys of objectionably large diameters, and as such a reduction is necessary in a number of cases in this arrangement, it is intended to substitute Renold silent chain gear. The sprockets can be made much smaller than the pulleys that they will displace and at the same time there is no slippage, and the installation once made is practically permanent.

A 7½-ton electric crane is installed in the south section of the old machine shop and travels the length of this wing up to the 60-ton crane runway. The north section, used as a boiler shop, is served by a 15-ton crane.

Lighting.—The arc lamps for the general illumination of the yards are wired in three groups independently.

from the three transformer groups already described. These groups may be turned on or off from the powerhouse by means of remote-control switches. There are to be altogether 104 enclosed-type arc lamps and about 800 incandescent lamps. In the locomotive shop Chapman wall sockets are provided at intervals and flexible cord connections with Chapman plugs will enable a light to be carried to any part of a locomotive or boiler.

Heating.—A hot-blast system, in connection with the Warren-Webster vacuum system, is to be used to heat the main building, while the other buildings are to be heated by direct radiation. The hot-blast system is to be installed by the National Blower Works, Milwaukee, Wis. Two sets of fans and heating coils are to be provided, one being located on a steel platform some 12 ft. above the floor in the old copper shop, and the other in a small addition on the north side of the new building. The first is to have a fan 12 ft. in diameter by 6 ft. wide driven by a 50-h.p. motor and drawing the air over heating coils containing 14,625 ft. of 1-in. pipe. The other fan is 10 ft. in diameter and 5 ft. wide, operated by a 40-h.p. motor and having heating coils of 10,600 ft. of 1-in. pipe. The distribution from these fans is made through galvanized iron piping 72 in. in diameter at the fans and gradually reducing as the distance from the fan increases. In the new shop the pipe is carried for the full length on each side, while in the old shop the ducts are swung just under the bottom members of the roof trusses.

The main exhaust header is to be used as a supply pipe to the heating system. It passes out of the building at each end of the tunnel in which it is run, and is provided at each end with a gate valve and an oil extractor. The return pipes from the heating system pass into this tunnel and are led to two Marsh vacuum pumps in the boiler room, adjacent to the feed water heater. Connection is made from the high-pressure steam header to the exhaust header for the purpose of supplying live steam to the heating system when necessary.

Tool List.

Groups with horse-power of motors for each.		Horse-power
Machine	Machine.	of motor.
No. 49.	Planer, 30 x 30 in.	15
68.	Planer, 36 x 36 in.	
79.	Boring mill, 52 in.	
27.	Slotter, 12 in.	
62.	Drill.	
35.	Lathe, 36 in.	15
53.	Lathe, 30 in.	
47.	Lathe, 48 in.	
54.	Axle lathe.	
46.	Wheel for boring machine.	
26.	Milling machine.	20
32.	Wheel press.	
42.	Quartering machine.	
59.	Wheel lathe, 76 in.	
33.	Wheel lathe, 76 in.	
36.	Wheel lathe, 76 in.	20
45.	Wheel lathe, 82 in.	
64.	Planer, 36 x 36 in.	
51.	Lathe, 36 in.	
48.	Lathe, 36 in.	
63.	Horizontal boring machine.	5
80.	Boring mill, 80 in.	
60.	Planer, 54 x 54 in.	
57.	Cylinder boring machine, 36 in.	

76.	Lathe, 25 in.	.....
69.	Lathe, 30 in.	.....
71.	Lathe, 22 in.	.....
83.	Lathe, 20 in.	.....
70.	Lathe, 16 in.	.....
75.	Lathe, 20 in.	.....
39.	Milling machine.	.....
81.	Key slotter.	.....
14.	Bolt cutter.	.....
102.	Bolt cutter.	.....
15.	Bolt cutter.	.....
84.	Lathe, 34 in.	.....
17.	Lathe, 16 in.	.....
20.	Lathe, 20 in.	.....
22.	Lathe, 16 in.	.....
1.	Lathe, 18 in.	.....
61.	Grindstone.	.....
18.	Bolt machine.	.....
2.	Lathe, 15 in.	.....
4.	Cut face (lathe, 20 in.).	.....
11.	Bolt pointer.	.....
12.	Nut tapping machine.	.....
3.	Turret lathe, 14 in.	.....
21.	Turret lathe, 16 in.	.....

88.	Guide grinder.	}	30
28.	Slotter, 12 in.	.....	
38.	Vertical milling machine, 52 in.	.....	
31.	Grinder (water).	.....	
30.	Milling machine, 30 x 30 in.	.....	
16.	Drill.	}	20
19.	Lathe, 24 in.	.....	
8.	Grinder.	.....	
103.	Lathe, 32 in.	.....	
5.	Lathe, 20 in.	.....	
41.	Drill.	}	3
29.	Drill.	.....	
24.	Shaper, 16 in.	.....	
40.	Shaper.	.....	
23.	Shaper, 14 in.	.....	
13.	Radial drill.	}	5
100.	Lathe, 18 in.	.....	
25.	Milling machine.	.....	
9.	Grinder.	.....	
37.	Grinder.	.....	
58.	Grinder.	}	5
6.	Lathe, 15 in.	.....	
7.	Lathe, 20 in.	.....	
101.	Lathe, 19 in.	}	5

Total horse-power of motors in machine shop. . 1601½

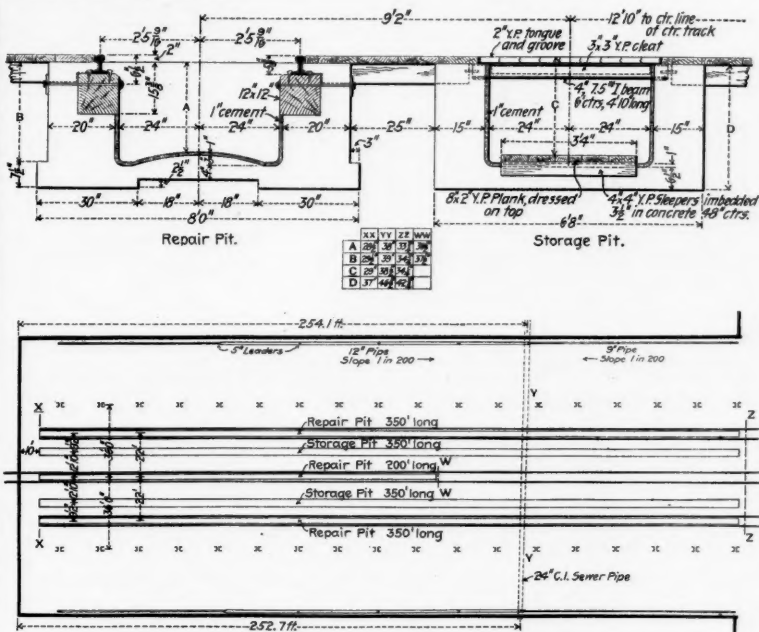
Norfolk & Western Improvements.

The annual report of the Norfolk & Western gives the following account of new work under way or proposed for next year:

To meet the growth of western traffic numerous long double passing sidings are being constructed between Vivian and Naugatuck, 93 miles, alignment being improved by reducing curvature, and eventually these long sidings will be connected and form a second track. Between Naugatuck and Kenova is 83 miles, with 15 miles of grade against the traffic. Instead of building a second track along the present line it has been decided to construct a new single-track line following the waters of the Big Sandy River from Naugatuck to Kenova, the distance by this line being some 60 miles. This new line will be used for heavy westbound traffic, the lighter eastbound traffic and empty cars using the old line. With this new line completed the company will have a line from the Pocahontas, Tug River, and Thacker coal fields to Portsmouth, Ohio, a distance of about 230 miles, without adverse grades. From Portsmouth to Columbus, Ohio, a distance of 100 miles, there will be no grades against the traffic exceeding 26 ft. to the mile when the improvements to that portion of the line now in progress are completed. With these improvements and with suitable yard facilities at Portsmouth, arrangements for which are now in progress, the company will be in a position to transport its heavy westbound traffic in maximum train loads at a minimum of cost.

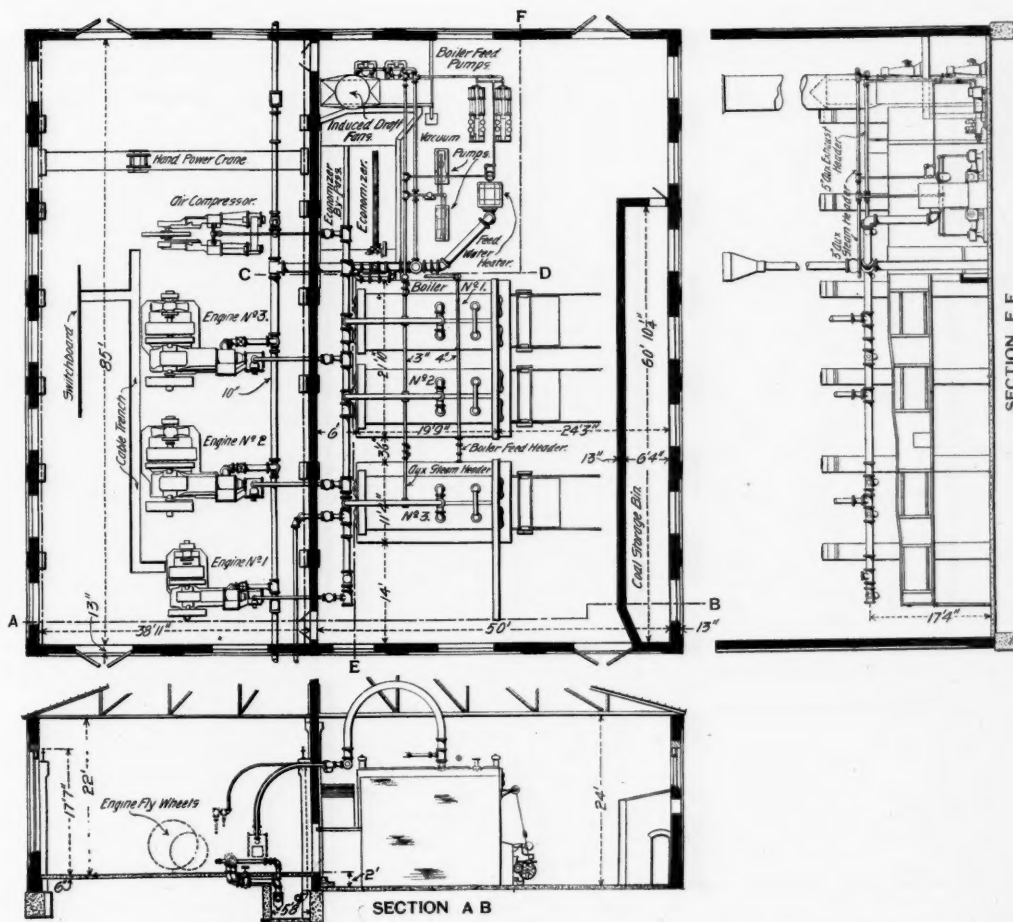
To provide for the increasing traffic to the East and South, the work of reducing curvature and grades and constructing second track has for several years past been in progress, and, at the close of the year, out of a total distance of 145 miles between Vivian and the summit of the Blue Ridge, 90 miles of second track were completed and in operation and 20 miles under contract. When this is completed there will remain a gap of 35 miles on which there are now some five miles of long double passing sidings which will in time be used as second track, reducing the length of second track still to be placed under construction to 30 miles.

Fig. 4.—Plan and Sectional Elevations of Repair and Storage Pits—
Michigan Central Shops, Jackson, Mich.



99.	Drill.	.....
55.	Drill.	.....
78.	Planer, 24 x 24 in.	.....
77.	Planer, 20 x 20 in.	.....
50.	Planer, 30 x 30 in.	.....
65.	Shaper.	.....
67.	Planer, 25 x 25 in.	.....
105.	Grinder.	.....
66.	Planer, 24 x 24 in.	.....
56.	Drill.	.....
104.	Shaper.	.....
74.	Lathe, 13 in.	.....
73.	Shaper.	.....
89.	Lathe, 32 in.	.....
72.	Lathe, 16 in.	.....
52.	Lathe, 22 in.	.....

Fig. 3.—Plan and Section of Power Station—Michigan Central Shops, Jackson, Mich.



This remaining portion of the work is on the New River, and owing to rock cliffs, necessitating several tunnels, the work is expensive, but necessary, and should be prosecuted to completion within the next two years. The second track should also be continued eastward from the Blue Ridge.

Substantial progress has been made in replacing wooden bridges and trestles with permanent structures, and when, within the next six months, the improvements now under way are completed, but little of this class of work, excepting upon your Cincinnati Division, will remain to be done upon the main divisions of your line. Good progress has also been made in straightening the line and reducing grades.

The relaying of the main divisions of the line with 85-lb. rail in substitution for rails of lighter weight has been proceeded with, and substantial progress has been made towards the completion of the proper ballasting of the line.

The repair shops at Roanoke have been enlarged and much new and improved machinery installed, and in general the physical condition of your property has not only been fully maintained, but has been materially improved.

The Roadmasters' and Maintenance of Way Association.

The twentieth annual convention of the Roadmasters' and Maintenance of Way Association was held at the Plankinton Hotel, Milwaukee, Wis., Sept. 9, 10 and 11. The attendance was quite large, about 80 members being present. The first session was called to order by President Walker at 10 o'clock. An address of welcome was delivered by Mr. J. H. Stover, representing the Mayor, and was responded to by Capt. Isaac Burnett, the first President of the Association. Twenty-three new members were elected and Mr. J. H. Linsley was elected to honorary membership.

The first report presented was on the education of young men for foremen and the discipline of section men.* The discussion was opened by Mr. M. Sullivan (Michigan Central). Others taking part were Messrs. F. J. Allen (C. B. & Q.), S. B. Rice (R. F. & P.), C. Buhner (L. S. & M. S.), F. R. Coates (C. G. W.), John Doyle (Pere Marquette). The difficulty of obtaining reliable and competent men for foremen was referred to by many. A plan for selection and education, which is quite generally followed and mentioned in the report, is that of selecting bright young fellows from the section gang and putting them in an apprentice gang. The necessity for higher wages for such men in order to hold them was emphasized, as otherwise they would yield to inducements offered in other lines at better salaries; yet it was the general opinion that two scales of wages in the same crew would not be practicable. Men intended for foremen might be made track-walkers at an increase of pay; or, it was suggested, each foreman might have an assistant foreman at a suitable salary. Frequent meetings of foremen and assistant foremen would be productive of good results. The practice of issuing instructions to foremen by dropping notes off of trains was condemned. Seeing this the men get the idea that their foreman does not know the details of his business.

On Tuesday afternoon an address was made by Mr. J. P. Brown, Secretary-Treasurer of the International Society of Arboriculture. Mr. Brown advocated the starting of tree plantations by railroads for the purpose of growing the timber, mentioning particularly the catalpa speciosa and the plantations of the Illinois Central and the Boston & Maine.

Following this the report of the committee on "Track Jacks" was presented. In the discussion a recommendation to reverse the committee's recommendation as to the uses of the light friction jack and the ratchet jack was voted down. The report was adopted after amending it by striking out the names of makers of the jacks, which the committee had included.

"Should Rails be Curved Before Laying?" was the subject of a paper by J. C. Rockhold, of the Santa Fe. Mr. F. J. Allen opened the discussion, agreeing with the writer of the paper that all rails for curves of two degrees and over should be curved accurately. The difficulty with the present roller bender is to curve the rails next to the ends.

The report on right-of-way fences, cattle guards and wing fences was read. The opinion was expressed in the discussion that none of the several types of cattle guards was effective, as cattle could get over any of them. It was suggested that an increase to 12 ft. in length would discourage cattle from attempting to jump the guards. Mixtures for whitewash were discussed at some length, and several recipes were given, in one of which a small amount of Portland cement is used, the proportion being 100 lbs. of cement to a barrel of lime.

The paper on "Track Drainage" by Mr. J. M. Meade, of the Santa Fe, was next discussed. Some speakers thought that glazed tile is superior to the porous article; for the latter does not remain porous very long after being buried in the ground, and the water finds its way into the line only through the joints. It was suggested that the porosity of the tile might be preserved by surrounding it with cinders, hay or straw.

On Wednesday morning the time was principally given over to a talk by Mr. M. J. Huss on a gasoline inspection car made by the Sheffield Car Co., Three Rivers,

Mich. Mr. Huss represents the makers. The working of the car was explained and questions were answered.

Ties, tie plates, and tie preservation were next taken up, and after the paper was read, Mr. C. Buhner (L. S. & M. S.), opened the discussion by describing his system of converting old rails into steel ties, in use on the Lake Shore. The rails can be electrically insulated from the ties by the use of elm shims, some of which were shown after being used in the track several months.

The discussion on ties and tie plates was continued Wednesday evening. The Kimball steel and concrete tie in use on the Pere Marquette was described (*Railroad Gazette*, March 14, 1902), and Mr. E. E. R. Tratman and Mr. W. M. Camp took part in the discussion, by invitation, giving information on tie preservation and the service of treated ties.

Two commissioners on cattle guards in the railroad department of the Canadian Government, Messrs. Holt and Robertson, were present and were invited to address the convention. These gentlemen have been traveling through the United States investigating the cattle guard question; and after their address, in which information was asked on this subject, and especially about the pit guard, a general discussion of the members brought out the information that this guard was no longer in use in this country.

The final session was held on Thursday afternoon, at which the report on "New and Improved Appliances" was read, and received without discussion. An amendment to the constitution, Article 4, Section V, was proposed, providing that hereafter one of the two vice-presidents of the Association shall be a man located south of an east and west line through Cairo, Ill., and the other shall be elected from some locality north of that line; also that the members of the executive committee shall be elected alternately from localities north and south of this line. No action was taken on this proposition, which may be brought up at a future convention.

The following officers were elected: President, John Doyle, Superintendent of Tracks, Pere Marquette; First Vice-President, F. R. Coates, Chief Engineer, Chicago Great Western; Second Vice-President, J. A. Kerwin, Roadmaster, Missouri Kansas & Texas; Secretary and Treasurer, Chas. McEniry, General Roadmaster, Chicago, Rock Island & Pacific (Northern District); members of the Executive Committee, C. E. Jones, Roadmaster, Chicago, Burlington & Quincy, and J. L. Single, Division Supervisor, Long Island R. R. The place selected for the next meeting is Kansas City, Mo. It was decided to have a four days' meeting.

Exhibits.

The exhibits were in one of the rooms on the second floor of the hotel, except gasoline motor cars which were on the tracks at the St. Paul station. Following is a list:

Adams & Westlake Co., Chicago, Philadelphia and New York.—Semaphore and distant signal lamps, North Western type of distant signal lamp, and small model of semaphore with lamp.

Alexander Car Replacer Mfg. Co., Scranton, Pa.—Car replacer and small model of truck and replacer.

American Steel & Wire Co., Chicago.—Steel wire fencing.

The American Track Barrow Co., Lowell, Mass.—Full-size and small models of American track barrows, pony cars and timber trucks.

American Washer & Manufacturing Co., Newark, N. J., and Chicago.—Samples of nut-locking washers. Descriptive matter of the D. O. Ward rail joint.

Atlas Railway Supply Co., Chicago.—Full-size models of rail joints and Atlas tie plate and rail brace. Large sectional drawings of Atlas rail joint.

Buda Foundry & Mfg. Co., Harvey, Ill.—Three samples of Paulus and one Wilson track drills; samples of pressed steel hand-car wheels, Buda derall and full-size semaphore stand.

C. Buhner, Sandusky, O.—Section of composite steel and concrete tie.

Cambria Steel Co., Johnstown, Pa.—Blue prints and full-size model of the 100 per cent. rail joint.

Chicago Crossing Co.—Samples of Ball's spring fasteners for bolts and of pressed steel rail joint plate.

Diamond State Steel Co., Wilmington, Del.—Track specialties and tie plates.

Dilworth, Porter & Co., Pittsburgh, Pa.—Samples of Goldie claw tie plate, Glendon flange tie plate and Goldie perfect railroad spike.

Doyle, Kimball & McWain, Detroit, Mich.—Full-size sample of concrete tie.

Dressel Railway Lamp Works, New York.—Steel semaphore and switch lamps, signal lanterns with long-burning oil fount, burning 175 hours with 3/4 pint of kerosene oil.

Elliot Frog & Switch Co., East St. Louis, Ill.—Small working model of Hasty three-throw switch and Eureka spring rail frog.

Fairbanks, Morse & Co., Chicago.—This company had in the exhibit room a line of hand car and track tools, also catalogues and other descriptive matter. The F. M. rail bender was exhibited at the company's warehouses nearby. A line of gasoline motor cars was on exhibition at the C. M. & St. P. station and Sheffield motor car No. 1 was taken to the convention hall and explained by Mr. Huss.

Federal Supply Co., Chicago.—Full-size models of the Wohaupter rail joint. Samples of the Federal tie plate with sections of ties showing the tie plate applied.

George Fuller, Chicago.—Spencer Otis Co., Sales Agent, Chicago and Omaha, Neb.—Samples and descriptive matter of the Hart tie plate.

Wm. Goldie, Jr., & Co., Pittsburgh, Pa.—Samples of the Goldie "Perfect" tie plug.

Goodwin Car Co., New York and Chicago.—Small working model of the Goodwin air-operated gravity dumping car. Circulars and descriptive matter.

The H. & B. Nut & Bolt Lock Co., Janesville, Wis.—Samples of malleable iron nut locks.

Hussey-Rinns Shovel Co., Pittsburgh, Pa.—Samples of shovels, spades and scoops.

The Johnson Wrecking Frog Co., Cleveland, Ohio.—Small and full-size models of the Johnson wrecking frog for steam and street railroads.

Edward Laas, Davenport, Iowa.—Samples of the L. & S. anti-creeping device for prevention of rail creeping.

Light Inspection Car Co., Hagerstown, Ind.—Sample motor inspection car.

McCord & Co., Chicago.—Catalogues and descriptive matter of the Gibraltar bumping post.

McGuire Manufacturing Co., Chicago.—Two full-size models of McGuire dwarf switch stands.

The MacPherson Switch & Frog Co., Niagara Falls, N. Y.—Small working model of the MacPherson patent safety switch and frog.

Chas. Morrill, Chicago.—Full-size "Cyclone" spike-puller. Descriptive matter of hardware specialties.

National Lock Washer Co., Newark, N. J.—Samples of National nut lock washers.

The National Surface Guard Co., Chicago.—Full-size model of new No. 7 metal surface guard for oblique crossings.

Pennsylvania Steel Co., Philadelphia, Pa., and Chicago.—Small models of New Century switch stand, Long safety switch stand, spring rail frog, reinforced split switch with adjustable connecting bar and also with Challenge adjustable connecting bar, anvil face frog. Copies of special edition of the *Harrisburg Telegraph*, showing views of plant and of work done.

Pettibone, Mulliken & Co., Chicago.—Improved track equipment. Printed matter descriptive of the improved roller rail-bender and straightener.

The Q & C Company, Chicago.—The Q & C Sampson rail-bender, the Q & C friction jack, Q & C rail saw and Q & C saw-grinder. Circulars and descriptive matter of the Dustless Road Process, Priest snow flanger, metal car steps, perfection oil purifiers and Q & C pneumatic tools.

The Railroad Supply Co., Chicago.—Samples and sections of Wohaupter, Q & W. and Servis tie plates. Pamphlets on crossing alarms; books on "Track."

Ramapo Iron Works, Hillburn, N. Y.—Small working model of Ramapo automatic safety switch and stand; also full-size safety switch stand.

Walker Car Replacer Co., St. Paul, Minn.—Small working model of the Walker car replacer.

The Weber Railway Joint Mfg. Co., New York.—Full-size models and sections of the Weber railway joint.

The Western Ballast Co., Aurora, Ill.—Samples of burnt clay ballast.

A Record of Treated Pine Ties.

The Atchison, Topeka & Santa Fe Railway has sent us a statement concerning the number of treated pine ties taken out of the track during the year 1901 together with the average life of the same and comparisons with previous years. The following table is compiled from this record.

Treated in year.	Process.	Taken out.			
		Cross ties.	Other causes.	Bridge ties.	Other causes.
1885	Wellhouse.	4,472	27	...	...
1886	"	4,907	138	...	...
1887	"	8,927	202	...	...
1888	"	12,478	402	...	...
1889	"	6,672	255	...	...
1890	Wellhouse.	8,547	48	...	...
1891	Burnetising.	7,136	37	...	...
1892	Burnetising.	16,817	280	109	...
1893	Wellhouse.	11,857	273	80	...
1894	"	7,644	689	100	...
1895	"	4,160	235	23	52
1896	"	1,799	550	...	...
1897	"	191	90	...	...
1898	"	127	197	...	...
1899	"	20	281	...	...
1900	"	5	594	...	...
1901	Burnetising.	2	73	...	...
	Marks illegible.	2,039	398	13	2
Total taken out,		97,800	4,769	325	54

A total of 102,948 ties were removed during the past 16 years. About 98 per cent. of these were from the Rio Grande, the New Mexico and the Western divisions. Of those removed, the majority had been treated by the Wellhouse process.

The average yearly service of the cross ties for the last five years is also given and is as follows:

Year.	Average service.
1901	10.58 years
1900	10.78 "
1899	10.78 "
1898	10.56 "
1897 (three months).	10.18 "

The average life of the ties on the Rio Grande division is greater than on any other division. This result is most likely due to the dry climate.

Federal Control of Corporations.

President Roosevelt, speaking recently at various cities in New England, has given his views on Trusts and their regulation; and he says that the national government must effectively regulate corporations which cannot be controlled by state legislation, even if it becomes necessary, in order to do so, to amend the constitution of the United States. Discussing this subject, the *Railway World* says:

A National incorporation law would place corporations whose business extends across State boundaries in a natural relation to the general government. It would give to their securities a standing and stability which only the oldest of them have, and make the corporate method of industrial organization a much more useful agency in the diffusion of wealth and comfort than it can be under present conditions. If, as now appears likely, the President's policy becomes that of his party, the business man, however reluctant to witness what he may regard as legislative experiments in an untried and dangerous field, will have to choose between two programmes each of which demands effective regulation. There will be no opportunity to give his support to a policy of *laissez faire* for no such policy will anywhere be publicly advocated. The choice will be between a definite and comprehensive National policy and one proposing to leave the matter largely to the separate action of the States. The former is broadly constructive and must lead to ultimate stability; the latter means the continuance of crude and conflicting local policies with many instances of grossly unwise restrictive legislation. There is unquestionably a great deal of danger in opening a great industrial problem to political controversy and legislative action, but the question of corporate regulation has long been an open one and the only way to close it is to enact substantially satisfactory laws. It may be more difficult to secure good laws than to de-

*Abstracts of this and other reports will be found in other columns.

feat bad legislative proposals, but good laws once enacted usually remain on the statute books while, in their absence, the defeat of bad ones has to be repeated at every session of the legislative body.

Harrison Street Low Pressure Pneumatic Interlocking.

The diagram given herewith shows the arrangement of tracks, switches and signals at the Harrison street terminal passenger station, the "Grand Central Station" of the Chicago Terminal Transfer Company, at Chicago, which station is now temporarily used by the trains of the Chicago, Rock Island & Pacific and the Lake Shore & Michigan Southern, while the terminal station of these roads at Van Buren street is being rebuilt. At present the traffic of the several roads at Harrison street aggregates 212 regular trains a day, viz.:

	Trains.
Chicago Terminal	14
Baltimore & Ohio	8
Chicago Great Western	12
Chicago, Rock Island & Pacific	178
Lake Shore & Michigan Southern	
New York, Chicago & St. Louis	

Until recently the switches and signals at this station were handled by the electro-pneumatic system. When it



Fig. 1.—A Cabin Which Pays No Ground Rent.

was found necessary to enlarge the capacity of the terminal it was decided to adopt the low-pressure pneumatic apparatus; and this has recently been put in by the Pneumatic Signal Co., of Rochester. All the switches and signals shown on the diagram, Fig. 3, are worked from a single cabin with three men working eight-hour shifts. There are about 1,200 train movements a day.

Owing to the necessity of economizing space it was found advisable to set the signal cabin on an open steel frame supported on narrow foundations between the tracks so as not to necessitate the abandonment of any of the tracks.

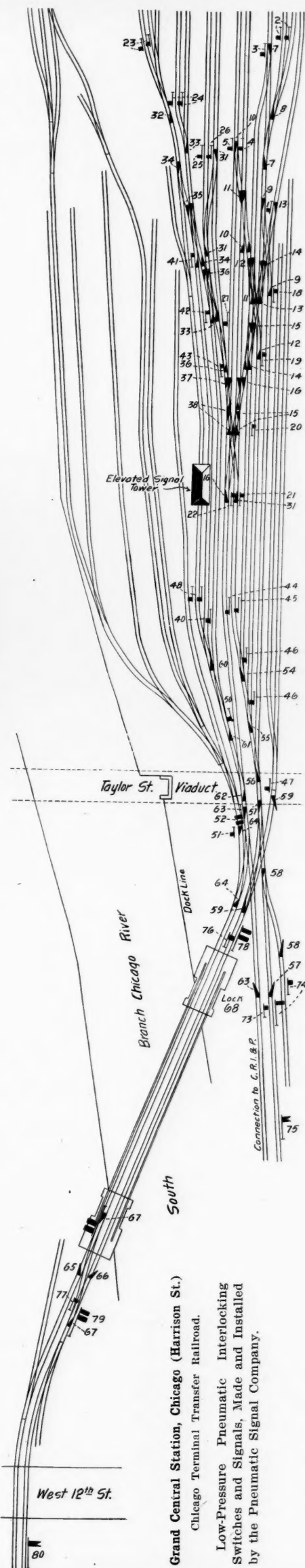
A view of this cabin from the south is shown in Fig. 1. It will be noticed that the track at the extreme left runs underneath the cabin. A better view of the cabin is shown in Fig. 2. This is the first installation of a pneumatic plant in a cabin of this kind, and affords an example of the highest economy of space and most complete freedom from surface obstruction.

The low-pressure pneumatic system of interlocking, now in use at the Grand Central Station, New York City; at Buffalo, Suspension Bridge, Chicago, Jamaica, L. I.; Jersey City, Philadelphia and elsewhere, is well known to readers of the *Railroad Gazette*. Briefly, its advantages are:

1. Requires no force but air.
2. The air pressure is always low; normally 15 lbs. per sq. in.
3. No auxiliary force, such as electricity, is necessary, and no vital function depends on gravity or springs or withdrawal or reduction of pressure.
4. All pipes are normally (except when a switch or a signal is being moved, etc.) subject to atmospheric pressure only.
5. The final movement of the lever is automatic, requiring no effort or care on the part of the operator, so that after pulling a lever he can leave it to go to another portion of the machine.

The power to operate this plant is furnished by an air compressor in the station, which performs other important duties. The signals return to the stop position by gravity, as in other systems, and in addition the placing of the signal at "danger" is insured by air pressure, the same amount of power being used to place it at danger as to place it at safety; in fact, the return "indication" is not possible until the movement of air used for it has first put the signal to danger. The dwarf signals are all locked, thus guarding against the liability of any careless or malicious changing of the arm by persons passing through the yard.

The machine at Harrison street has 68 operating levers and 12 spare spaces. These levers work 42 signals, 68 switches and one bridge lock.



Roadmasters' and M. W. Association—Abstracts of Reports Read at the Milwaukee Meeting.*

Best Methods of Making Foremen, and of Discipline.

There is increasing difficulty in securing young men of suitable qualifications for foremanships, as these qualifications are advancing all the time. In former times many good foremen were illiterate, many not being able to read or write, but with modern standards and methods men of some education and capability of development are required. The difficulty lies in the inadequate compensation. The right kind of men can get more lucrative employment in other lines. The report enumerates the multifarious duties of the section foreman, indicating the extent of general knowledge he must possess and the responsibility attaching to his duties. "He must be posted on the book of rules, he must know much about rules governing trains, he must understand and be up-to-date on the time card, he must have character and good habits, vision and hearing, must know the use of signals, he must inspect the track each morning and guarantee its safety, using his own judgment, he must watch for obstructions, have a knowledge of the capacity of waterways, have a knowledge of masonry, know about bridges and strength of same, he must be so reliable that he will patrol the track in storm, have the material in his charge well cared for and where it can be gotten at quickly, must have his



Fig. 2.—Harrison Street, Signal Cabin, Chicago. Low-pressure Pneumatic Interlocking.

tools in place and all rubbish picked up, grass and weeds mowed on the right of way, fences in good condition, must report on wrecks, stock killed, know how to put foot-guards in frogs and obey special instructions, look out for fires, know that the signal lights are out, help when there is a wreck, all day and all night if it is required, and assist all other departments in laborious work; and yet he must have all his own work done, and that with a regular crew of section men. When the daily labor hours are over he must make out and keep a record of his own time and that of the men under him, and make requisitions for supplies needed on his section. He must know how to write letters and keep books without the aid of a stenographer or bookkeeper. He must understand how to raise the track, take out the sags, smooth the surface and tamp the joints, keep the proper elevation and alignment of rails on curves, and when he knows all of this and has it done, he will be considered a fairly good section foreman, if he has the base of mile post mounds built with white-washed rock and has a few flower beds along the line.

The process of education should begin with the section gang. Probably the best plan is to select young men with the apparent mental qualifications, who have joined the gang, and at once begin to work them in charge of crews. Such men the roadmaster must keep carefully under his eye, talking with and instructing them frequently. The foreman must have the importance of accuracy and thoroughness impressed upon him, as the lives of all of the passengers going over his section are under his care. Meetings of the foremen for discussion of matters would prove instructive and beneficial.

As to controlling section men, the days of swearing at them are fast disappearing. However, they must be firmly dealt with. They represent a great variety of characters. The foreman must be a student of human nature to handle his men successfully. The report is signed by L. Bradley, chairman; S. B. Rice, A. L. Mead and E. P. Hawkins.

Track Jacks.

The committee has carefully inquired of the roadmasters and supervisors of many of the trunk lines as to the jacks used by them. While there is still room for improvement, we find that jacks are the best adapted tool for raising track. The track jacks that give the best results to-day are the ones that will raise the track safely and accurately, and release quickly. In yards, around switches and frogs, the work is heavier than elsewhere, consequently the strongest jack, even though not as quick as others, would be satisfactory. Out on

*A report of this meeting appears on another page.

the road the best and quickest jacks are required in order to prepare the track with despatch for traffic. For general track repairs a light jack is needed, one that one man can handle. For general track repairs, a jack not exceeding 65 lbs. in weight is recommended. For new ballasting, a friction jack not exceeding 95 lbs. The report is signed by T. Hickey, chairman; D. E. Crowley, A. M. Hawkins, T. J. McClosky.

Should Rails be Curved Before Laying?

This query is answered by the writer of the paper in the affirmative, for, he says, "If it is essential that rails on tangents be perfectly straight, then it is equally necessary that rails for curves be accurately and uniformly bent to fit the particular curve for which they are intended. This rule applies with equal force to all curves of 2 deg. and over." The writer then relates an experience he once had. It was on a new road having all curves scientifically laid out. Very soon the curves began giving trouble and an examination disclosed the fact that the rails had never been curved before laying and were fast straightening out. The engines were "hogs." The peculiar actions of a locomotive or car passing around one of the curves at this time naturally gave the uninitiated the impression that a succession of sharp corners were being turned at the rate of 50 miles an hour. Originally the curving of rails was accomplished by blocking up each end of the rail 18 or 20 in. from the ground, and while eight or ten men stood on it to prevent recoil from the blow, one or two others would strike the base and ball vigorously with a 12-lb. sledge from end to end, by which process the rail was not only curved, but all the life was hammered out of it as well. If when turning it up "workways" it was found to have been curved too much, it was again turned over, with the curved side up, and the previous performance repeated. This method, if such barbarous treatment can be dignified by the term, was ultimately displaced by the "curving hook," which was better in one particular at least, in that it left no visible marks on the rail. In time this gave way to the various forms of "jim-crow" and "rail-bender," and to-day the "roller" bender is standard on most of the leading lines. This bender is either operated by hand or steam power, and is the best machine for curving rails. But any method of cold bending has the effect of separating the granules of which the rails are composed, and causes a deterioration for which no amount of after care will compensate. When we consider the unlimited resources and facilities of the modern steel concerns, there appears no reason why rails cannot be curved at the mills while hot, as easily as they can be turned out straight. This would avoid a separation of the crystals and avoidance of the destruction of elasticity and strength. In ordering rails it would be necessary to send a list of the curves to be laid, together with length, degree, number and milepost location; and the better to facilitate the work of distributing, this same data should accompany each shipment, either appearing on the way-bills, or marked on the rail with paint, or both if necessary, to give no possible excuse for errors. In this manner rails could be accurately, and economically curved without damage, thus prolonging their life and usefulness, and reducing to a minimum the number of accidents directly traceable to "broken rails on curves." Signed by J. C. Rockhold, A., T. & S. F. R'y.

Fences, Surface Cattle Guards and Wing Fences.

Right of Way Fence.—For a substantial and hog-tight fence in a rough or rolling country, we recommend a fence built of five barbed wires, one plank at bottom and one at top, the two bottom wires being hog wires, spaced as per blue print No. 1. The posts to be 7½ ft. long, spaced in fence 8 ft. apart, posts being made of cedar. This fence should only be maintained in a rough or hilly country where woven fence would have a tendency to pull posts up on low spots. On level country, we would recommend a 26 in. or 28 in. woven wire (square mesh), at bottom, with three barbed wires on top; posts to be same length and same space as fence No. 1. For common fence, not hog-tight, we would recommend fence made of five barbed wires, spaced as per drawing No. 1, using 7-ft. posts, spaced 8 ft. apart in fence; posts to be made of best available timber with stay wires every 20 rods. All braces in all fences should be made by using fence posts as shown in drawing.

Surface Cattle Guard and Wing Fence.—The committee has never seen or used a surface cattle guard which gave entire satisfaction without making a pit under the guard by using wider timber than the regular cross ties and cleaning the ballast to the bottom of the ties. This should not be done, as it allows water to soften the roadbed and the ties to shift out of place, which generally causes low spots in track. A surface guard should be made with the top surface of some sharp brads or discs. The discs should be so placed that when an animal steps on them they will roll under the foot of the animal; or brads should be sharp enough so that they will hurt or pain the animal. All surface cattle guards should be at least 12 ft. long. Wing fences should be of same material that cattle guard panel is made of. The committee recommends that wooden wing panels be maintained and that one panel of wing fence be made of boards adjoining the cattleguard panel; balance of wing fence should be constructed the same as balance of right-of-way fence. It is not advisable to use a full board line fence from cattle guard out to right-of-way

line, as such fence obstructs the view of the engineer so that he cannot see stock which might be standing behind the fence. One panel of board fence adjoining cattle guard can be white-washed. Many people would drive on to a crossing and never know they were approaching a railroad where the line fences not white-washed. Therefore, all line fences at public highway crossings should be kept white-washed. Signed by W. Shea, chairman; P. Rockwell, D. Foley, R. H. Penticost.

Drainage.

Beyond doubt the most essential factor in track maintenance is good drainage; the worst enemy track has to contend with is water and poor drainage. A severe rain storm will often spoil weeks and months of hard and expensive track work by the section men, by neglect in this direction. Frequently cuts will break away and slide in from the hillside water. This can often be permanently stopped by surface ditching placed some distance back from the top edge of the cut. In cases where this will not give relief the trouble can often be overcome by cutting vertical trenches on the slope of the cut from top to bottom about 15 or 20 ft. apart, mounding up the excavated dirt between the ditches. The writer has known of some very bad cuts, where a whole hillside seemed to be moving and coming in, permanently stopped from sliding by these vertical trenches. This plan also applies to sliding banks. We often meet with material in wet cuts, where the stone ballast will not keep the track smooth; bad cases of this kind are often cured by increasing the grade in the cuts and introducing porous tiling in the ditches and putting a good lift of cinders on top of the stone ballast. The cinders being porous do not retain the moisture.

In arranging the shape of the roadbed great attention should be given to this question of drainage; the very life and safety of the track depends upon it.—J. M. Meade, A., T. & S. F., Topeka.

New and Improved Appliances.

The subject being broad the committee has decided to select the following: 1. Levelers or spreaders; 2. Ballast cars; 3. Track moving cars; 4. Frogs; 5. Switch points; 6. Cattle guards and signs; 7. Foot guards.

1. Levelers or spreaders are recommended on all bank widening or embankment work and ballasting for additional parallel tracks. These machines can be divided into two general classes:

(a) Those in which the spreaders or wings open downward and outward; and (b) Those in which the spreaders or wings fold against the sides of the car. The committee recommend the use of levelers operated by air with wings on both sides of the car.

2. The most improved self-loading cars should be used. The committee recommends a ballast car of the gondola style holding about 30 cu. yds., with the bottom of the car so arranged as to rapidly deposit the material where needed.

3. A track moving car is a new device; one having just been placed on the market; while we do not make any recommendation, we call the attention of the Association to the fact that such a device is now in use and is worthy of investigation.

4. Frogs should be divided into the following classes: First, spring rail; second, rigid; third, movable wings; fourth, jump frogs; fifth, crossing frogs.

The committee recommends spring rail frogs on main tracks, excepting at junction points or double-track endings; the spring rail frogs to be 15 ft. long and of a No. 10 angle. The springs should be placed near the heel of the wing rail. A steel raising block to carry worn wheels is to be placed in the crotch immediately behind the points of the wing rail of the frog. Also the wing or movable rail should be grooved. Rigid frogs of a No. 10 angle should be used on all side tracks and in all yards. And also at junctions; these to be of a No. 15 angle.

The jump frog is operated the same as a switch; a frog laps over the main or running rail. By the use of this the main line is left unbroken at the frog when set for straight track. For crossing frogs the committee would recommend where the ordinary rigid crossing is used that the same be constructed of three rails with plates at the angles. Of these three rails, one is the easement rail, the next the main track rail, and the third the inside guard rail. In any crossing where the number of the angle exceeds that of a No. 6, movable points are recommended.

Switch points: The committee would recommend that in all main line switches, excepting in special cases, points 15 ft. long be used. In yards, points 10 ft. long with one rod and not re-enforced are recommended. Plates should be placed on each tie under the point and a gage plate directly at the point.

6. Cattle guards and signs: The committee would recommend that a surface guard be used; in some States the construction and style of cattle guards are covered by law.

In regard to signs we would recommend that they be constructed of metal, except at highway crossings where the signs are provided for by law.

7. Foot Guards: We would recommend that metal foot guards be used on the heel of all split switches, at each end of frogs and at guard rails. No switch, frog or guard rail should be called complete without the metal guard.—Signed by F. R. Coates, chairman; C. Buhner, C. B. Teller, W. A. Hill, C. E. Jones.

Ties and Tie Plates, and Preservation of Ties.

With nearly 250,000 miles of railroad track, main lines and sidings, consuming annually 100,000,000 cross ties at an approximate cost of about \$50,000,000, it is not strange that the source of supply, quality of material and preserving methods should be earnestly discussed. By reason of forest fires, the lack of interest in timber culture, and the great demand for lumber, we can scarcely expect this class of timber to become less valuable than it now is. Yet, notwithstanding adverse conditions, through modern preserving methods, good roadbeds, heavier rails and a liberal use of metal tie plates, soft, and commonly called inferior timber will prove to be reasonably satisfactory, and wooden ties will continue to be generally used for many years.

Some years ago the cost of rail renewals exceeded the cost of tie renewals, but now this is reversed and the tie renewal expense exceeds the former. This may, no doubt, be accounted for through the use of large quantities of inferior, untreated timber, increase in weight of rolling stock and high speed of trains. A few lines seem to have succeeded in keeping down the expense of tie renewals below others, carrying about the same tonnage, but this seems to be frequently attained by allowing ties to remain in the track two or more years after they should have been taken out, thereby showing—on paper—a comparatively small charge to the tie renewal account; but very often this saving is made at the expense of the rails, rolling stock and cost of operating.

The tie records of our American lines have been of little value in determining the relative merits of timber and preserving methods; but recently this matter has been receiving attention and hereafter will, doubtless, be more satisfactory. The experiments of the railroad companies, the United States Department of Agriculture and technical institutions are being diligently prosecuted, and a great deal of timber, heretofore rejected, will be made available for ties.

There are a number of preserving methods in use. The principal ones are creosoting, the "Wellhouse" or zinc, tannin and glue process, and "Burnettizing," which consists of the use of chloride of zinc only. To get the best results we should begin in the forest. Tie timber should be cut in the fall or early in the winter, when it contains the least fermentable sap and will dry out evenly. Ties should be thoroughly seasoned before they are treated and then properly piled after treatment until they are well dried before being laid in the track.

Ties should be of even thickness and tamped their full length. Spikes should be smooth and well pointed to prevent damage to the wood fiber.

Spike lining and re-driving of spikes, being very destructive to wooden ties, should be avoided as much as possible.

Tie plates, not less than ¼ in. thick, should be used on every soft wood tie in main tracks. They should be punched to perfectly fit the rails when the spikes are driven straight, and the best results are obtained when the tie plates are embedded in the ties before they are put in the track. This is sometimes done by a tie plate press in which two plates are set with one blow, the power used being steam. The cost per plate is from one-half to three-fourths of a cent and from 3,000 to 4,000 ties can be plated in 10 hours.

Another tie-plating machine is operated by hand and the power is derived from an eccentric. Ten to 12 men can full plate about 1,000 ties in a day. This machine is simple and quite satisfactory. Both machines are, as a rule, only operated in material yards. We know of no satisfactory device for embedding plates without removing the ties from the track.

The rapid deterioration of wood makes the use of metal or composition cross-ties desirable, and, while a great many patents have been issued in the last 60 years—about 500 for metal and 20 for composition—we know of no considerable number having been laid in tracks in this country. This is principally due to their large cost. On our western lines we should need better ballast and more perfect drainage to prevent corrosion. We do not know of any patented composition ties in general use, but experiments are now being made with a combination of cement and metal.—Signed by J. E. McNeil, chairman; M. Sullivan, P. H. McFadden, W. J. McClaren.

Prevention of Frost in Automatic Signal Apparatus.

Mr. H. S. Balliet, Assistant Engineer of Signals of the Lehigh Valley, has secured a patent on an arrangement for agitating the air in an automatic signal box, for the purpose of preventing formation of frost on the connections. In severe weather, signal apparatus is often liable to disturbance by this cause. Mr. Balliet arranges a small fan, with an independent motor, suitably controlled by wires connected with the signals, so that the air in the box, especially around the commutators, can be kept in motion; and this expedient has been found by trial to prevent the troubles from frost which were previously experienced. With the air sufficiently quiet and the temperature sufficiently low, frost will sometimes form on the commutators and insulate the brushes; and in springs normally open it will sometimes form such a coating as to insulate the contact points one from another. In extreme cases, the bearings, chains and gears have been found with heavy accretions of hoarfrost, which cause much friction.

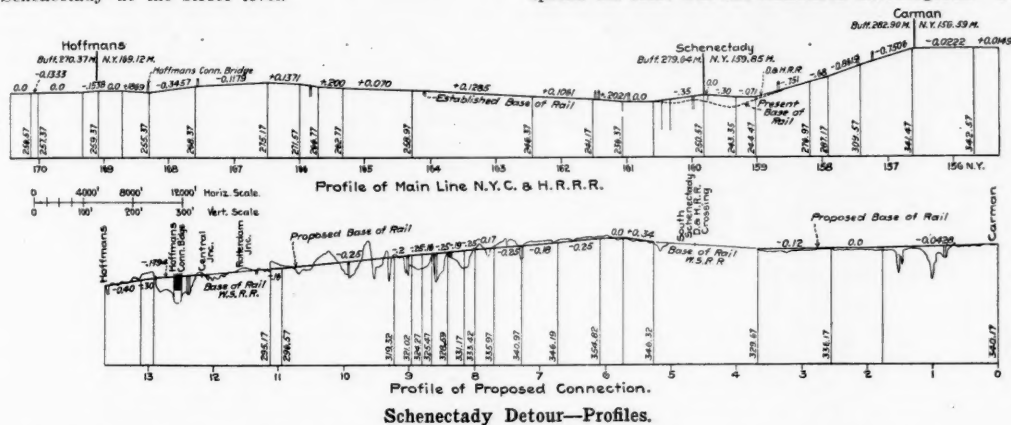
It has been found that trouble from frost occurs principally in the early hours of the forenoon; that is to say, during the time after the sun rises and heats the atmospheric air and before the temperature has risen inside the box. The fan motor is started whenever the track-circuit relay opens and stops when the relay closes, though of course it can be run by the inspector at any time. A 2 in. fan has dissipated a thick coat of frost in nine seconds, the fan running 500 revolutions a minute.

The Schenectady Detour of the New York Central & Hudson River Railroad.

The engravings show the alignment and profile of an important improvement by which the New York Central line is carried around Schenectady, saving a heavy grade and also saving the passage of many trains through Schenectady at the street level.

regarding the proper placing and angle of the diaphragm elicited the opinion that the best effect was obtained by extending the diaphragm forward of the exhaust nozzle and in referring to the proper angle occasion was taken to criticize the Master Mechanics' arrangement, it being the belief that its angle with the vertical is too acute, which would have the effect of retarding the draft through the upper flues. No standard front-end arrangement to meet conditions the country over could be adopted, as there was considerable variation in these governing conditions.

The meeting adjourned before this discussion was completed and it was resumed at the Wednesday morning session. Taking up the smoke-stack question, opinions as to whether the jet should fill the stack from top to bottom or merely fill it at the top, were at variance, both conditions having advocates. The use of a bridge to spread the blast was not considered advantageous. Two



Schenectady Detour—Profiles.

Under existing conditions eastbound trains on the main line must ascend a grade of 40 ft. to the mile approximately 2½ miles long, just east of Schenectady. Pushers are used to assist the heavy trains. In 1900 what is known as "Hoffman's Connection" was completed, connecting the New York Central and the West Shore at a point seven or eight miles northwest of Schenectady. All freight for Weehawken is now carried over this connection and the pusher grade above mentioned avoided for this portion of the traffic.

The Schenectady detour, work on which is now in progress, will enable all eastbound freight to avoid the pusher grade and carry all freight in both directions, not intended for Schenectady, around the city instead of through it. From Central Junction, where Hoffman's Connection joins the West Shore to South Schenectady, the work consists of additional tracks along the West Shore, together with an improvement of existing grade and alignment. At a point in South Schenectady the detour leaves the West Shore and a double-track connection, a little over 3½ miles long, joins the New York Central main tracks at Carman at the top of the pusher grade.

On this 3½-mile connection there will be no grade crossings of streets or highways, all (six in number) being depressed and carried under the tracks. At a point a little less than a mile west of Carman the New York Central main tracks are crossed by an overhead bridge.

Excepting a short piece of 21 ft. to the mile on Hoffman's Connection, no grade on the detour will exceed 13 ft. to the mile against eastbound trains. Compared with the alignment of the New York Central main line the curvature by the detour will be increased 173 deg. and the length 1.16 miles. The saving effected by avoiding the pusher grade, diminished by the added length and curvature, much more than justifies the expenditure involved.

All work is to be of a most substantial character. The highway crossings are to be New York Central standard solid floor bridges resting on concrete abutments. The few water ways encountered are small and will be carried through the embankments by concrete arches.

The Traveling Engineers' Association.

The tenth annual meeting of the Traveling Engineers' Association was convened at the Stratford Hotel, Chicago, Tuesday, Sept. 9, at 9.15 a. m. Mr. Howard S. Taylor, City Attorney, in behalf of the Mayor, welcomed the convention. Mr. Robert Quayle, Superintendent of Motive Power of the Chicago & North Western, addressed the members, referring at some length to the qualifications required by the men operating railroads, and spoke of the good work accomplished by the road foremen of engines.

President W. G. Wallace spoke of the encouraging condition of the Association at the present time and made mention of the fact that several members had received promotions to higher positions during the past year. The Secretary's report showed the present membership to be 408. Following this Mr. George W. Wildin, who was the delegate of the T. E. A. to the Master Mechanics' Convention at Saratoga, read his report on the proceedings of that convention.

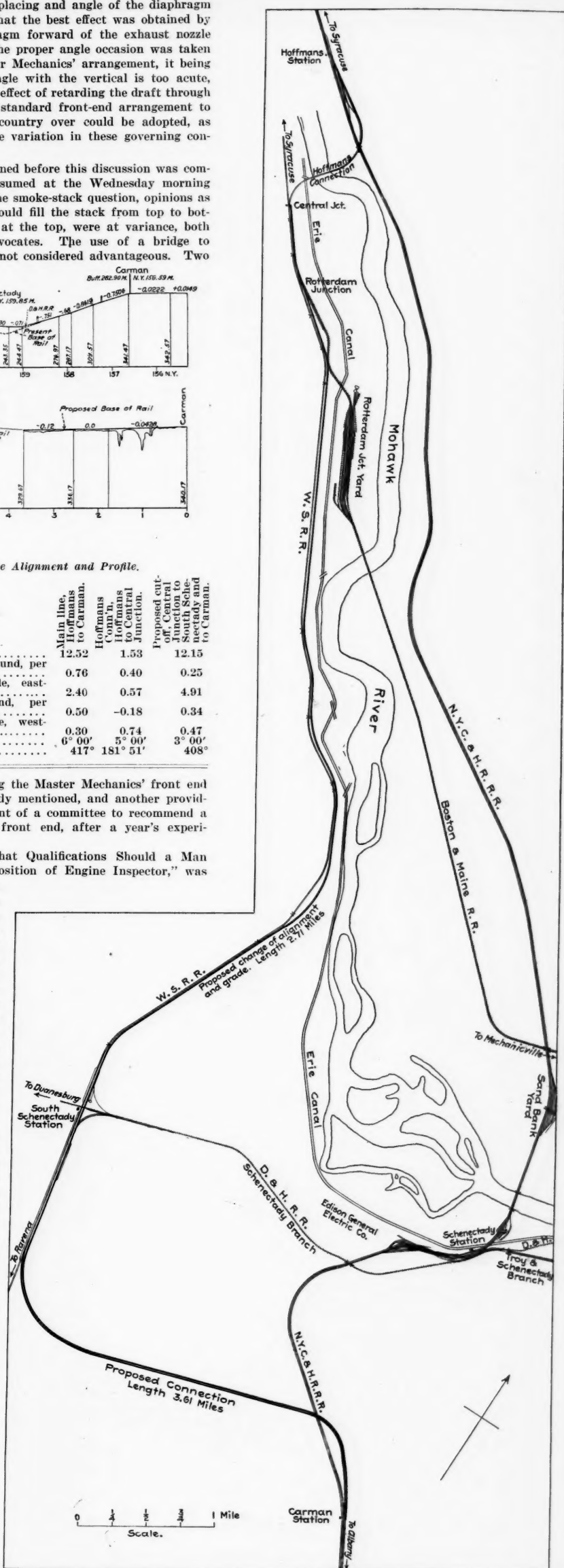
The committee reports were then taken up, the first being "The Best Method of Drafting Locomotives for All Kinds of Fuel, Stack Included." Abstracts of the reports (there were six) will be found in another column. This first report was discussed at some length. Queries

Characteristics.	Main line, Hoffman's Connection to Carman.	Hoffman's Connection to Central Junction.	Proposed cut-off, Central Junction to South Schenectady and Carman.
Distance in miles.....	12.52	1.53	12.15
Maximum grade, eastbound, per cent.....	0.76	0.40	0.25
Length of max. grade, eastbound, miles.....	2.40	0.57	4.91
Max. grade, westbound, per cent.....	0.50	-0.18	0.34
Length of max. grade, westbound, miles.....	0.30	0.74	0.47
Sharpest curve.....	6° 00'	5° 00'	3° 00'
Total curvature.....	417°	181° 51'	408°

motions, one criticizing the Master Mechanics' front end arrangement, as already mentioned, and another providing for the appointment of a committee to recommend a 'Traveling Engineers' front end, after a year's experiment, were passed.

The report on "What Qualifications Should a Man Possess to Fill the Position of Engine Inspector," was next considered.

In the discussion the opinion of most of the members seemed to agree with that of the committee, that a man with considerable road experience would give the best service as an inspector. Such men know by actual experience just how long an engine may remain in service and the importance of each defect, while the man lacking in such experience, even though he be a competent machinist, might often take an engine out of service that could stand a few more runs. It was thought that a competent inspector's salary should be at least \$100 a month. The sense of the meeting on this subject was summed up in the following resolution: To fill the position of engine inspector a man should be selected who is well educated, a good, progressive mechanic, who has had road experience as engineer and fireman. He should further have executive ability and tact in handling men. He should receive good remuneration and his standing should be such as to give him some hope of promotion.



The New York Central & Hudson River Detour at Schenectady.

"What is the Best Method of Securing Complete and Intelligible Reports of Work Needed on an Engine to Fit Her for the Next Trip?" was next taken up. The discussion extended over into the Thursday morning session and many members were of the opinion that the engineman should be held responsible for reporting all defects to his engine, whether it was in a pooling system or not. The conclusion finally reached was that the question was properly covered in the report.

The paper on "Oil Fuel Tests" was briefly discussed. Two letters incorporated in the paper, one a series of questions regarding the fuel and the other the replies given, among other things referred to burned fire-box sheets and leaky flues. In the discussion such members as had personal knowledge of the use of oil fuel stated that very little trouble is experienced from leaky flues, and cases of burned fire-box sheets are of rare occurrence.

It was necessary to hold a fourth session, on Friday morning, in order to complete the business of the convention. Taking up the paper on "The Proper Handling of Compound Locomotives," it appeared that experiences with the use of the compound on different roads varied considerably. The necessity for having dry steam for the compound was mentioned, to produce which a desirable depth of water over the crown sheet is about 11 in. A trouble which had been encountered through the drawing of smoke into the by-pass valve, causing the formation of a gum, had been overcome by drilling a 1/2-in. hole in each end of the valve, as near the head as possible, and applying valve oil. Some roads follow the practice of working a small amount of steam in the cylinders going down hill to prevent pumping the hot gases into the valves and cylinders.

It was suggested that the unsatisfactory results from compounds were probably due to lack of experience in repairing them. Mr. W. C. Hayes, of the Erie, said that while he is favorably inclined to the compound, comparative tests on several roads, including his own, had shown the simple engine to be more successful in operation than the compound of similar class and tractive power. The difficulty of properly packing the compound results in their being enveloped in clouds of steam, which, in cold weather particularly, frequently necessitates the engineer's shutting off in order to see ahead.

On the other hand, Mr. C. P. Conger, of the Chicago, Milwaukee & St. Paul, reported that the results from the use of compounds on that road were entirely satisfactory, particularly in passenger service. They have in service some 125, with 30 building and 60 more ordered. The difficulty of steam leakage mentioned by Mr. Hayes had been overcome by them, although there is not now a satisfactory form of piston rod and valve stem packing to be had.

A report on "The Cheapest and Safest Method of Disconnecting Large Modern Locomotives in Case of Break-down" was presented by reading several letters which had been received on the subject. The ideas developed by the discussion were to the effect that in case of a breakdown the primary consideration was to get the main line clear as quickly as possible; and that it might be cheaper to tip an engine over and never reclaim it, rather than to block mail and guaranteed freight trains through inability to get the engine on to a side track.

A paper on "Lubricating Driving Boxes" was read by Mr. E. W. Brown, of the D., L. & W., and a motion to include it in the Proceedings was carried.

Following are the subjects for committee reports at the next convention:

1. Traveling engineers' front end arrangement, adaptable to modern power.
2. Most satisfactory method of lubricating piston rod and valve stem packing, also cylinders and engines equipped with piston valves.
3. Taken from an economical standpoint, how do you consider the use of brick arches in locomotives burning bituminous coal: deep, shallow or wide fire-boxes?
4. Is there any advantage in placing the main check valve above water line of boilers where the feed-water contains lime? Where scale forms on injectors, tubes, etc., what is the best method of removing same?

The subjects for individual papers will be as follows:

1. Is the water glass a valuable adjunct to the successful operation of modern locomotives?
2. What practice should traveling engineers pursue in riding on engines and instructing engineers, to obtain best results?
3. Is it desirable that freight and switch engines be equipped with combined straight and automatic air-brake on engine and tender? What are the advantages and disadvantages in having an engine so equipped?

In addition to these topics the subject of "Proper Handling of Compound Locomotives" was continued as a paper.

Officers.

The following officers were elected: President, D. Meadows, Michigan Central; First Vice-President, R. D. Davis, Illinois Central; Second Vice-President, G. W. Wildin, Central R. R. of New Jersey; Third Vice-President, J. D. Benjamin, Chicago & North Western; Secretary, W. O. Thompson, International Corres. Schools; Treasurer, Jas. McDonough, Gulf, Colorado & Santa Fe; J. S. Seelye, Galena Oil Co., was elected to succeed W. J. Walsh, the retiring member of the Executive Committee. The Association will meet in Chicago again next year.

Exhibits.

The following companies had exhibits at the convention:

C. B. Ault, Chicago.—Samples of the Homestead locomotive blow-off valves; also Superior chemical compound with samples of scaled pipe and of precipitate removed from feed-water.

The Jno. F. Brady Steam Turbine Co., Chicago.—Descriptive matter of the Jno. F. Brady steam turbine.

The Clyde Machine Works, Chicago.—Small working model

of the Clover crank pin turning machine. *Railroad Gazette*, Sept. 12.

Crane Co., Chicago.—Locomotive muffler pop valves; globe and angle valves.

The Engel & Fagersten Chemical Co., Chicago.—Descriptive matter of the Neptune anti-fouling compound for boilers.

The Federal Supply Co., Chicago.—Samples of Rogers' improved journal packing and receptacle for car axle box. Small working model of Toltz automatic ash pan and the Robertson ash and cinder conveyor.

Illinois Malleable Iron Co., Chicago.—Small working model of the Bruyn automatic swinging smoke-jack.

Jerome & Elliott, Chicago.—Descriptive matter of Jerome metallic packing.

The Mann-McCann Co., Chicago.—Small working model of the Westmark flue rattle.

Michigan Lubricator Co., Detroit, Mich.—Sample Michigan improved No. 3 triple sight-feed lubricator; automatic driver-brake retainer, and sight-feed lubricator for air and of air pump. Blue prints and descriptive matter.

The Nathan Manufacturing Co., New York and Chicago.—Samples of improved Monitor and Simplex injectors, Kilger's reflex water gage, gage glass shields. Blue prints. Descriptive matter of Nathan triple sight-feed lubricator.

The Railroad Supply Co., Chicago.—Exhibiting the E. R. Cook acetylene headlight apparatus, including gas generator, burner and pressure regulator. Samples of Fahrig aluminum bearing metal; locomotive truck bearing shown which had run over 12,000 miles with less than 1/16 in. wear.

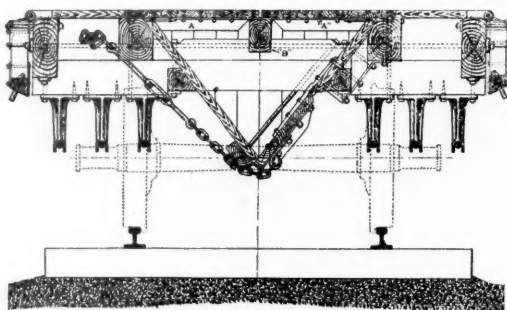
Safety Train Order Signal Co., New York.—Full size model in operation of the Safety train order signal.

Wm. Sellers & Co., Philadelphia, Pa.—Sectional model of Sellers' injector.

Stannard & White Co., Appleton, Wis.—Catalogues and descriptive matter of locomotive cab seats, locomotive enginemen's specialties, folding furniture and the Atlas railroad car mover.

Some New Types of Rodger Convertible Cars.

It has been just a year since we described a new convertible hopper and gondola car brought out by the Rodger Ballast Car Company of Chicago. (*Railroad Gazette*, Sept. 20, 1901.) In that article the objections to the old style of ballast cars were mentioned and the manner in which these objections were overcome in the new type was described in detail. The new type met with immediate success, large numbers being ordered by various roads in different parts of the country. In our issue of April 4, 1902, the car as built for the Atchison, Topeka & Santa Fe was illustrated and described. Since that time some new designs have been brought out and these are shown in the accompanying engravings. Notable among these is the class C-S, which is a side or center dumping flat-bottom convertible gondola. As the name indicates, this car is capable of being used for three forms of service. The class F-H is the latest of the new designs. It is a flat car with center-dump feature and



Hart Convertible Car, Class F. H.

has several points of very considerable advantage; for while suitable for all of the traffic in which flat cars are ordinarily used its adaptability for ballast service makes it at once especially desirable. When converted into a hopper car the sides are low enough to enable the old-style steam shovel to work over the top of the load. To compensate for this decreased depth of load the length of the car is increased to 40 ft. over end sills, giving a capacity of 30 cu. yds. The class C-C, the original form of convertible gondola, was described last year.

In addition to the decided economy resulting from the use of ballast cars which are available for ordinary freight traffic and may therefore be kept in service the year through, it may be mentioned that a train of Rodger cars, with a distributing car, will unload and distribute ballast at the rate of 600 to 700 cu. yds. in 20 minutes, leaving a clear track. A train of 20 cars can be managed by three men. The conversion from one form into another can be performed by these three men anywhere in the field, with monkey wrenches, in about 45 minutes.

Subjects and Committees for the Master Mechanics' and the Master Car Builders' Associations, 1902-03.

The subjects and committees for these two associations for the year 1902-1903 have recently been announced by the Secretary, Mr. J. W. Taylor, The Rookery, Chicago.

MASTER MECHANICS' ASSOCIATION.

1. Ton-mile Statistics.—To determine what is the proper tonnage credit for switching locomotives, and also any other subjects pertinent to the general question. C. H. Quereau, chairman; G. R. Henderson, George L. Fowler.
2. Electrically Driven Shops.—To present statistics and information in regard to electrically driven shops. C. A. Seelye, chairman; H. H. Vaughan, T. S. Lloyd, G. W. Demarest, L. R. Pomeroy.
3. Locomotive Front Ends.—To assist in the tests now being conducted at Purdue University, Lafayette, Ind., by the *American Engineer and Railroad Journal*, on locomotive front ends. H. H. Vaughan, chairman; F. H. Clark, A. W. Gibbs, R. Quayle, W. F. M. Goss.
4. Specifications for Locomotive Driving and Truck Axles.—To submit specifications for locomotive driving and truck

axles; also to confer with the International Association for Testing Materials. A. E. Mitchell, chairman; Samuel Higgins, W. S. Morris, R. H. Soule.

5. Pipe Unions.—To confer with the pipe union manufacturers and submit drawings of proposed standard forms of pipe unions. C. H. Quereau, Thos. Fildes, E. M. Herr.

6. Locomotive Forgings.—To work in conjunction with the American Society of Mechanical Engineers, the American Institute of Mining Engineers and the International Association for Testing Material in preparing specifications for locomotive forgings. The committee to be continued until after the 1904 meeting of the International Railway Congress, and report results of its investigations in 1903 and each successive year until its work is completed. F. H. Clark, J. E. Saque, H. H. Vaughan.

7. Present Improvements in Boiler Design.—To present recent improvements that have been made in boiler design, with suggestions as to future improvements. G. R. Henderson, T. W. Demarest, O. H. Reynolds, John Player, David Van Alstine.

8. Piston Valves.—To investigate the subject of piston valves, with special reference to recent improvements. F. F. Gaines, R. P. C. Sanderson, F. H. Clark.

9. Locomotive Performance.—To outline tests and experiments affecting locomotive performance, to be carried on by experts under the direction of committees of the Association. F. M. Whyte, A. W. Gibbs, E. D. Bronner.

10. Revision of Standards and Resolutions.—To revise the standards and resolutions of the Association, and bring them up to date. R. H. Soule, W. McIntosh, A. M. Waitt.

11. The Progress of the Year.—To embrace improvements in locomotives, shop practices, new machines, tools, etc., and to submit new principle and methods for discussion. A. M. Waitt, E. M. Herr, S. F. Prince, Jr.

12. Cost of Running High-Speed Trains.—W. W. Atterbury, A. M. Waitt, H. D. Taylor.

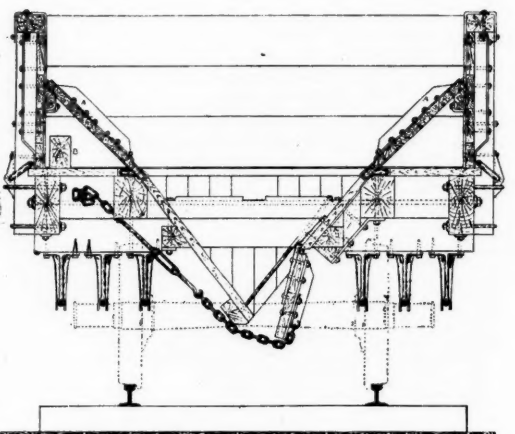
13. Subjects.—G. M. Basford, R. D. Smith, A. L. Humphrey.

MASTER CAR BUILDERS' ASSOCIATION.

1. Draft Gear.—E. D. Bronner, chairman; G. E. Wilson, W. F. Kiesel, Jr., A. L. Humphrey, S. F. Prince, Jr., Mord Roberts, T. A. Lawes, L. G. Parish.

2. Side Bearings and Center Plates.—B. Haskell, chairman; T. W. Demarest, A. E. Benson, J. W. Luttrell, G. N. Dow.

3. Cast-Iron Wheels.—Wm. Garstang, chairman; J. J. Hennessey, Wm. Apps, D. F. Crawford, W. H. Lewis.



Hart Convertible Side or Center Dump Car, Class C. S.

4. Outside Dimensions of Box Cars.—C. A. Schroyer, chairman; G. W. Rhodes, Joseph Buker, W. P. Appleyard, F. D. Casanave.

5. Pipe Unions.—B. Haskell, chairman; W. H. Lewis, Thos. Fildes.

6. Steam and Air Line Connections.—H. F. Ball, chairman; T. W. Demarest, J. T. Chamberlain.

7. Collapsible Journals.—F. W. Brazier, chairman; F. H. Clark, L. T. Canfield.

8. Signal Lamp Brackets and Sockets.—W. P. Appleyard, chairman; D. F. Crawford, A. E. Benson, F. W. Brazier, W. F. Bentley.

9. Pedestal and Oil Box for Passenger Cars with Axles Having 5 x 9-in. Journals.—J. R. Slack, chairman; Wm. Renshaw, G. L. Miller.

10.—Car Lighting.—L. T. Canfield, chairman; R. D. Smith, D. F. Crawford.

11. Standard Requirements for High Speed Foundation Brake Gear for Passenger Service.—F. M. Whyte, chairman; R. N. Durbinow, F. H. Clark, C. A. Schroyer, J. W. Luttrell.

12. Subjects.—C. A. Schroyer, chairman; A. E. Mitchell, F. W. Brazier.

STANDING COMMITTEES—M. C. B. ASSOCIATION.

On Arbitration.—W. S. Morris, P. H. Peck, J. J. Hennessey, D. F. Crawford, E. D. Bronner.

On Supervision of Standards and Recommended Practice.—A. M. Waitt, chairman; T. W. Demarest, L. T. Canfield.

On Triple Valve Tests.—G. W. Rhodes, chairman; A. W. Gibbs, W. McIntosh, W. S. Morris, C. A. Schroyer.

On Brake-Shoe Tests.—Chas. Collier, chairman; Wm. Garstang, Prof. W. F. M. Goss.

On Tests of M. C. B. Couplers.—R. N. Durbinow, chairman; W. P. Appleyard, Joseph Buker, W. S. Morris, F. H. Stark.

OFFICERS—M. C. B. ASSOCIATION.

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Vice-Presidents.—F. W. Brazier, New York Central & Hudson River Railroad, New York; W. B. Appleyard, New York, New Haven & Hartford Railroad, New Haven, Conn.; Joseph Buker, Illinois Central Railroad, Chicago, Ill.

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*S. F. Prince, Jr., Philadelphia & Reading Railway, Reading, Pa.

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†Term of office expires June, 1903.

*Term of office expires June, 1904.

The Most Northern Railroad.

Since it became important to get men and goods into the Klondike region, accounts of the railroads built and building there are often seen in the newspapers. Writers who speak of the White Pass & Yukon road, which runs from Skagway, Alaska, to White Horse, generally refer to it as the most northern railroad in the world. The Wild Goose road, which maintains a precarious existence throughout its entire five miles, inland from Cape Nome, being quite devoid of ballast or grading, frozen solid during the long winter months, and thawed to death in the summer, is also referred to as the northernmost bit of track in existence. But there is a railroad in regular operation, quite well ordered in construction and equipment, which lands passengers, freight and mail many miles nearer the north pole than do either the White Pass & Yukon or the Wild Goose lines, both of which terminate well south of the Arctic Circle.

At the head of the Gulf of Bothnia, in northern Sweden, is the port of Lulea, a town of almost 5,000 inhabitants, distinguished as the southern terminus of a railroad which runs to a point 52 miles inside of the Arctic Circle. Nome is almost 200 miles south of this; White Horse over 450 miles. This Swedish railroad is a well kept, well built line, of the standard Swedish gage, which is the same as our own, and it carries iron ore to the Gulf from the mines at Malmberget in Swedish

along is pretty and green, and it is hard to realize in the summer time that the same parallel in which Malmberget is located, continued east and west, leaves Iceland and the Klondike to the southward and cuts across the White Sea 195 miles north of Archangel.

The Pennsylvania Railroad in New York.*

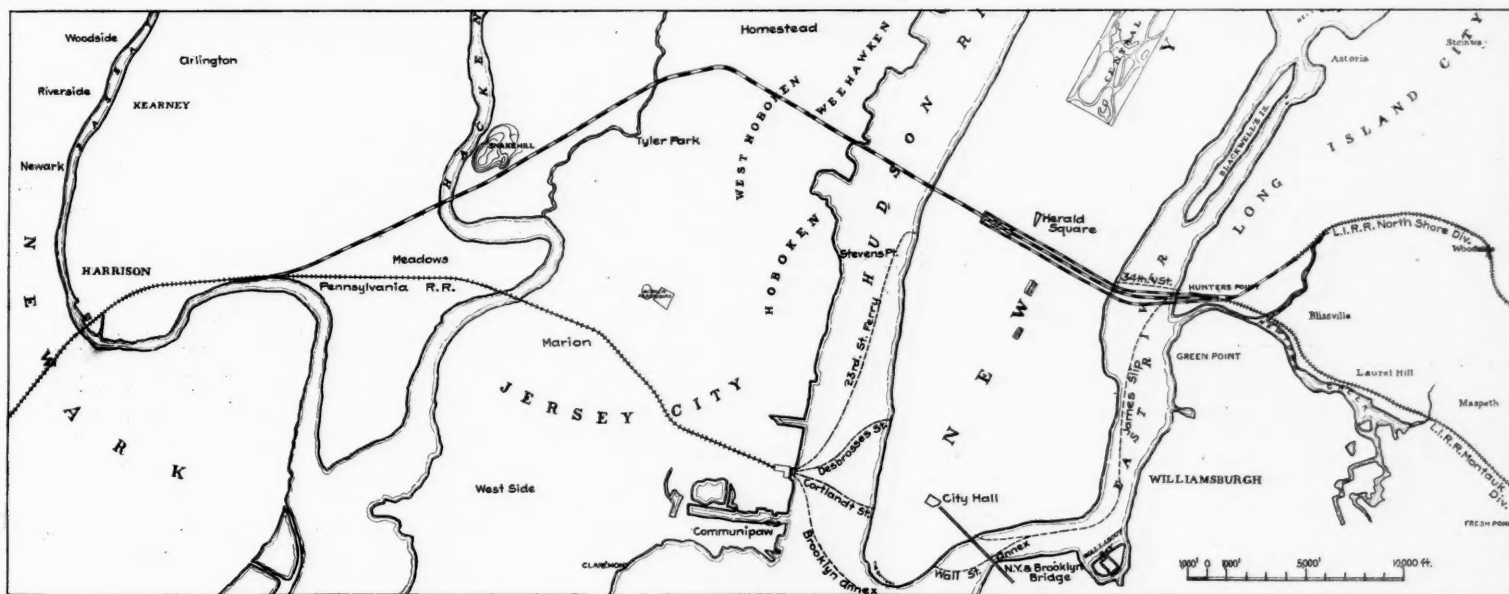
The great undertaking of the Pennsylvania Railroad in carrying its line across Manhattan Island and in establishing a station on the Island will cost something like \$40,000,000, about \$25,000,000 of which will be paid for labor. This enterprise, so bold and so unprecedented in its engineering and financial aspects, has special interest for citizens of New York. The money will be spent within five years, the work will give employment to a great number of people, it will largely increase real estate values in New York City, and in the suburbs, and it will add to the ease and comfort of those who have occasion to come and go. It is not a philanthropic enterprise, but many engineers and transportation officers who have given attention to it do not believe that a reasonable interest will be earned on the investment for at least 10 years to come. In other words, it is a long shot into the future, and is an extraordinary example of imagination and daring.

The new line begins at Harrison on the east side of the Passaic River, just across from Newark. It runs along the south side of the Pennsylvania main line for about 5,000 ft., at which point it has reached such an elevation that it can cross to the north side overhead. Then it trends to the northward across the meadows, to the west side of the ridge just back of Hoboken. On the meadows the line crosses seven railroads besides the main line of the Pennsylvania itself, and an important highway on which is a double-track trolley road, and it

The engineering studies are being developed by a commission of six expert engineers, and it is reasonable to expect that the methods in general, and in detail, will be quite up to the highest state of the art. In fact, they will necessarily establish a new state of the art because of the novelty of the conditions.

Such, very briefly, are the elementary engineering features of the work. It will be full of details which will interest the layman as well as the engineer, and of which we may perhaps speak in a later article.

The elementary traffic features may be considered for a moment; and first we will look at the queer notion that there is underneath all this a deep and subtle plan to take trade through New York to some new or, at least, distant port, as, for example, Montauk Point. It is probable that no living man who has thought carefully about the matter with information and with a candid mind, takes the Montauk Point port seriously. If there were any sufficient object in starting passengers and mails on their transatlantic journey from some point east of New York City, why make a new harbor at Montauk Point? For many years there has been an excellent harbor at New London, which may be reached from New York City by one of the best railroads in the world. In truth, the facilities for transferring all freight between cars and ships are so overwhelming greater in New York harbor than anywhere else, or than can be provided anywhere else without vast expenditures, that no railroad company can take the traffic away from New York, or can afford to try to take it away. Again, the eccentric notion has recently been brought forward that connection of the tracks of the Pennsylvania with any other railroad company on Manhattan Island must be prevented. Underneath all this is probably the old country storekeeper and country tavern idea, that for the good of a town travel through it must be obstructed:



A Sketch Map of the Pennsylvania's New Line Across New York City.

Lapland. With methods of mining somewhat primitive but quite efficient, iron of a very high grade is produced at the little town in the Lapland hills, and after the rail haul to the Gulf, is carried from Lulea by water, or by rail, via the junction at Boden, just north of Lulea, to Stockholm.

From Lulea to Malmberget, the distance by rail is about 160 miles, the line running slightly west of north through a country very sparsely inhabited, with almost continuous woods of light green, stunted, evergreen trees, with their limbs slanting down instead of upwards because of the long burden of snow they bear. On some atlases the railroad is made to continue across to the Ofoten Fiord on the coast of Norway—very far north indeed—but the line beyond Malmberget is purely imaginary, and it is difficult to see where enough traffic would come from to support such a project. Malmberget is far enough north so that it has the midnight sun in June, and even in August the sun just barely dips under the hills at 11 p.m., and then the crimson sunset travels through a short ellipse and becomes sunrise in the east at two in the morning, without losing a trace of its beauty in between. The main residence town in these parts is Gellivare, just below Malmberget, and there is an excellent little inn here, built in the prevailing style, of heavy square timber, where candles are unknown between the last of May and the first of September. The census population of Gellivare is nearly 4,000, but the figure evidently includes a large contiguous territory as well, since there is only a small population in evidence near the railroad.

There are two through trains daily in each direction, between Lulea and the northern termini at Gellivare and Malmberget, and the running time is not far from seven hours, including stops. The trains are made up of second and third-class cars, the second-class being quite clean and comfortable, and very exclusive, since travel as luxurious as this is seldom indulged in in Swedish Lapland. Besides the through traffic, there is some little local business between Lulea and the farming towns along the line, 30 or 40 miles north. The country all

also crosses the Hackensack River. All of the crossings are over grade. This necessitates continuous embankment, or viaduct, from Harrison to the tunnel portal at the west side of the ridge, about six miles.

At the Bergen ridge the line enters a rock tunnel, and emerges again in Long Island City, the total length of tunnel being a little under six miles; the total improvement from Harrison to the junction with the Long Island Railroad is 12½ miles. This is all costly work. Not a foot is on the natural surface; all is in tunnel, or cutting, on an embankment or viaduct.

Across the North River will be two tunnels, and across the East River will be four, these various tunnels meeting at a great central station to be established on Manhattan Island between Seventh and Ninth avenues and between Thirty-first and Thirty-third streets.

On Manhattan Island the rail will never be nearer the surface than 40 ft., and everywhere it will be below mean tide level. In fact, at the highest point of the tunnel the rail will be about 10 ft. below mean low water. Obviously, the station platforms will also be below tide level. Under the Bergen ridge the grade of the tunnel will be 255 ft. below the highest point of the hill. Under the North River it will be 35 ft. below the natural bottom of the river, and 80 ft. below mean low water. Under the East River the depths are about the same.

The method to be adopted for driving these tunnels has not yet been decided on, because of the magnitude of the work and because of the peculiar conditions. Across the North River the tunnels will be driven all the way in silt. There the old Hudson River tunnel furnishes experience which will be useful to the engineers of the new tunnels. It is not believed that there will be any extraordinary difficulty in the North River. Under the East River the situation is worse. Deep pockets of silt and of quicksand are found on either side of a ridge of rock, and the method of carrying on this work will have to be studied with great exactness to avoid interruption.

*An article by H. G. Prout, printed in the *New York Times*, Sept. 14.

but the modern man knows that travel or commerce must be attracted to a town by reasonable inducements, and that any effort to prevent its flowing through and going beyond will do more harm than good.

Finally, if it were desired to take trade beyond New York, that could be done by means far cheaper than by this 40-million-dollar undertaking. Interest on this vast sum can only be earned by serving the people of the great cities of New York and Brooklyn.

One great object in building this new connection is to establish direct communication from a station in the heart of New York City with the whole continent west of the Hudson River. Passengers to and from will not pay more for the privilege of landing in New York City, or leaving from New York City, than they do now. The rates are largely competitive. The Pennsylvania's opportunity to make money is by getting more passengers to go by its lines, and this can be done only by making it pleasanter and more convenient for them to go that way. The great volume of the suburban passenger business coming now to the west bank of the North River will probably continue to enter New York City by the ferries, for reasons that we need not go into now.

Another direction in which the volume of traffic will be increased is across the East River to Long Island. Here a large growth must be looked for, and it is not impossible that the revenue earned on the east side of the new central station will be greater, before many years, than the revenue earned from the traffic through the tunnels on the west side of that station. This is a speculation, but it does not seem improbable. It should be apparent, therefore, that the Pennsylvania Railroad Company has but one hope of financial success in this tunnel enterprise; namely, by giving to the people who travel to and from Greater New York, conveniences and attractions which they do not now enjoy. We need not now enter upon the terms of the franchise, but there are those who think that the Pennsylvania Railroad Company made a mistake at the outset in not asking the city to co-operate in the cost of bringing its lines to the center of the Island. The city could well have afforded to do so.



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EDITORIAL ANNOUNCEMENTS.

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The gross earnings of railroads in August, as compiled by *The Chronicle*, showed a gain of 4.76 per cent. Although this is less than in recent months, yet it is regarded as very encouraging, especially in view of the fact that it follows exceptionally large increases in other years. In August, 1901, the increase in gross was 13.43 per cent. None of the anthracite roads are included in this August report.

The Train Staff for Electric Railroads.

Mr. H. D. Emerson, in a recent issue of the *Street Railway Journal*, advocates the use of the "train staff" for insuring safety from collisions on single-track inter-urban electric railroads. The editor of that journal does not endorse his correspondent's view, and seems to think that something electric will be better; but Mr. Emerson's proposition has great merit. The train staff has the merit of simplicity, cheapness and security, and it has been tested by long time and use. Mr. Emerson says, in part:

The student has realized for some time that the conditions which exist on electric railroads do not differ materially as far as the operation of trains is concerned from those which exist on steam railroads. That is to say, that many years of experience in operating trains by means of steam has developed certain rules and principles which cannot be violated without danger of accident. On the other hand, the conditions which exist on most trolley roads are more favorable to safe operation, especially as regards collisions, than on steam roads. A principle and a method which has been in use for many years, and which is being used with extreme satisfaction and absolute safety on steam roads, and which is particularly adaptable to the operation of high-speed trolley lines, should not be overlooked. When, in addition to the fact that the principle is right and the method simple, the cost of the appliances are less than any other form of signaling apparatus, it would appear that its use should be much more extended on trolley lines than it is at present. I refer, of course, to the block system and its application by means of the "train staff." Nearly all of the single-track steam railroads in Great Britain are operated by means of the train staff.

Most people take it for granted that the block system is adaptable only to roads of dense traffic. It should be noted, however, as a matter of fact, that the block system can be used on any railroad and that the appliances absolutely necessary are extremely inexpensive. Electric railroads lend themselves particularly to the use of an absolute block, because trains are usually run at definite intervals and at constant speed.

It would seem that there would be no reason why the absolute block system, as operated by the train staff, should not be adopted on all high-speed electric railroads. The staff might consist of a large ring 10 in. in diameter, with a metal tab showing the number of the block, a simple hook could be placed on a pole with the corresponding number painted on the pole. This should be placed near enough to the track so that the motorman could reach out and remove the staff from the hook and hang it on a hook in the car without stopping his car, and at the end of the block he would replace the staff on a hook and take aboard the staff for the next block.

To more fully explain Mr. Emerson's position we copy the principal clauses of the staff rules of a prominent English railroad.* It will be observed that the staff requires no telegraph and very little paraphernalia. It is ideally simple. Its disadvantage lies in the necessity for using tickets where two or more trains move eastward before any moves west-

ward; and in the equally important necessity, if we may judge by what we learn from England, of having an attendant at every meeting-place. It seems reasonable, however, to expect that this last condition can be modified; and the use of tickets should be neither more nor less of a hindrance here than in England.

If this system is not adopted the choice of a method of safe operation of electric cars lies between (a) the electric-light schemes which are now in use on a small scale here and there, and (b) automatic block signals, such as the steam railroads use. (A third method would be the use of time-tables and telegraphic orders—"the American despatching system"—but this may be left out of the present discussion. It does not seem likely that any exclusively passenger road, with frequent trains or cars, will put up with its delays and other disadvantages. Some of the electric roads which now use this system seem to deem it necessary to relax some of the safeguards.)

None of the electric light schemes that we have seen have been thoroughly developed, and we cannot learn of any that have been properly tested under the severe conditions that any signal would have to encounter on a high-speed railroad in a time of extra heavy traffic. To meet these conditions a conservative signal engineer demands that a signal shall always give notice of its own failures, shall be so designed as to fail on the side of safety if at all, and in its essential parts shall be as simple as possible. It is not clear that any of the new schemes fulfil these conditions.

The chief obstacle to the use of standard block signals, like those of standard railroads, is the cost. The Boston Elevated (double track) has adopted them in spite of this. On single track, with moderate traffic, managers do not feel warranted in making the necessary expenditure. This question of apparently excessive cost is also a factor in considering the electric-light signals, for the more elaborate schemes of that sort require several line wires, as well as delicate apparatus. On the same ground we omit from our present consideration the electric train staff, which provides as perfectly for a road of irregular traffic as for one on which trains always regularly alternate in opposite directions.

But without regard to the detailed merits or demerits of the several devices mentioned, and without regard to whether it would require a movement of 20 cars a day, or a hundred, or a thousand, to justify an expenditure for their introduction and use, the question now before us is, Why not adopt a space-interval system which costs next to nothing at all? Collisions occur on the thinnest lines.

Mr. Emerson's argument is based largely on the assumption that interurban electric roads would need no staff-tickets whatever. Quite possibly this is true of many roads; or true to such an extent that with telephones at every meeting point a despatcher could quickly provide for all the exceptions to the rule. Where this is the case the problem would seem to be quite simple. Having loops with easy curves at every meeting point, and a rule requiring every car to always turn out to the right (or always to the left); with two suitable posts, to enable the motorman to conveniently deliver one staff before reaching the point for taking the other, and with good discipline, there would seem to be nothing in the way of success. With no attendant at the staff post, rigid discipline would be the critical element in the whole business. Unless every motorman and conductor could be miraculously endowed at the outset with cautiousness and conscience, the service would have to be subject to regular surveillance. But this is not a drawback; moral character and intelligence are necessary with any system; and constant supervision is necessary to make sure that you have them.

The staff system is worth what it costs even if it costs some delay, but the question of running through meeting stations at considerable speed is a practical one. With a plain shelf at the post, and a wooden staff 20 inches long it would be possible for the motorman to deliver the staff at speed probably fully equal to the average speed now attained through meeting stations where curves are sharp and a switch has to be turned. (With an attendant at the station the motorman's problem is to pick up the staff; if there is no attendant, his greatest difficulty is to deliver it; to so deliver it that it will be readily takeable by the next motorman.) The suggestion of a hoop follows the experience of Indian railroads for the past dozen years; but it remains to be seen how successfully a hoop can be thrown off at, say, 20 miles an hour, and be made to land in such a position that it can be immediately picked up again by another man moving at the same speed. We should be much surprised if American gumption failed to pro-

vide, on demand, a successful and simple device for speeds considerably above 20 miles an hour.

When it comes to providing tickets with the staffs, so as to be able to move two or more trains successively in the same direction, the problem is more difficult. On many roads, no doubt, it would be found that the traffic would stand the delay of full stops for tickets in the few cases where "trains" had to be run in sections, the non-stopping rule prevailing for the bulk of the traffic. All that a staff ticket amounts to is that it affords evidence that its possessor has seen the staff at the beginning of his trip through that section of the road. With adequate discipline it is, of course, possible to provide a substitute for this.

The American Locomotive Company.

The first annual report of the American Locomotive Company for the year to June 30, was made public last week. The results of the year have been very satisfactory. The company earned and paid 7 per cent. dividends on the preferred stock, and had left a surplus sufficient to pay 5 per cent. on the common. This surplus of \$1,251,312 was not divided, however, but was carried to the profit and loss account, and against it was charged \$1,027,077 for land, new shops, machinery, etc. The directors thought it wise to charge these improvements against current income, rather than to carry them to the "cost of property" account.

The President points out a number of gains that have been realized by the consolidation; amongst others are the gradual unification of methods through the interchange of ideas, and the more intimate knowledge of the cost of building locomotives through a carefully classified uniform system of accounting. He says that it has been the aim of the directors to increase profits through reducing cost rather than through higher selling prices, and it is not the purpose of the Board of Directors to advance locomotive prices, except as may become necessary through advances in the cost of labor and material. It is believed that the next year will show still further advantages in reduced cost of building. Contracts are booked for delivery as late as one year from now, and deliveries are being made on scheduled time.

It will be remembered that the American Locomotive Company is capitalized at 50 million dollars, half of which is 7 per cent. preferred stock, and there is no funded debt. The income account for the first year was as below:

Gross earnings	\$26,398,394
Operating expenses	23,291,217
Net earnings	\$3,107,177
Fixed charges	105,865
Profit available for dividend	\$3,001,312
Dividend on preferred stock (7 per cent.)	1,750,000
Surplus	\$1,251,312

The expenses include a liberal outlay for maintenance and betterments, and also a charge of \$602,151 for radical additions and improvements. During the year the company spent \$1,629,228 for land, buildings, machinery and tools, and the output was increased more than 25 per cent. over the combined production of the constituent companies the year before the consolidation. A formidable list of improvements and additions is printed in the report, but the costs of these are not given. It is proposed, however, to carry still further expenditures of this sort, payable out of current income.

Annual Reports.

Chicago, Milwaukee & St. Paul.—The directors of this company were last week able to declare their belief in the continuing prosperity of this company by increasing the dividend rate on the common stock to a 7 per cent. basis, as compared with the 6 per cent. rate adopted in March, 1901, before which date 5 per cent. had been paid for three years; 4 per cent. in 1896 and 2 per cent. in 1895. The annual report for the year ended June 30, 1902, shows the earning capacity to easily justify the larger dividend, with a surplus over all charges of \$9,640,458, equal to 9 1/4 per cent. on the \$104,866,400 total capital stock outstanding on June 30 last, the issue having been increased by \$4,386,000 in the past year by issue of \$2,362,100 new common stock for improvements, and by conversion of \$2,024,000 convertible bonds into the 7 per cent. preferred stock; an operation which has been chiefly responsible for bringing the outstanding preferred stock up to \$46,682,000 from a total of less than \$13,000,000 in 1873. Even in 1897 the outstanding preferred stock was only \$29,055,000. This surplus over fixed charges, as above, was reported with the expenditure of about 24 per cent. of the gross receipts of the year in maintenance accounts and a further expenditure of \$2,475,000, or nearly 5 1/4 per cent. of the gross receipts as a lump appropriation to the renewal and improvement account, which has absorbed similarly large appropriations in each of the last five years.

Chiefly the St. Paul's increased tonnage is attributable to the expansion in low class mineral products and in manufactured goods. The company's soft coal tonnage exceeded its tonnage in spring wheat; and the freight from iron and other ores was within 300,000 tons as large as that in wheat, the gain in this latter item being particularly noteworthy. This tonnage, in fact, nearly doubled in the year, increasing by 473,000 tons.

*See first page.

We may venture to bring forward as one indication of western prosperity and of the new "buying power" of the west (not to say its consuming power) the fact that the St. Paul in 1902 moved over its lines 546,000 tons of "wines, liquors and beers," or 212,000 tons (practically 70 per cent.), more than in the previous year. This was the fourth largest aggregate increase in any commodity carried by the St. Paul Railroad last year, and the percentage of increase was much beyond that reported for any other freight moving in considerable quantities.

The sum of the changes in traffic movement in 1902 was an increase in freight earnings of \$2,158,820, or 6.88 per cent., and increase in gross earnings for the year of \$2,219,392. These gains in gross receipts followed uninterrupted additions to revenue since 1897, since which year the total gains run up to the heavy sum of \$15,000,000, which is equal to an enhancement of practically 50 per cent. in gross revenues. The income account for the last two years may be briefly summarized below:

	1902.	1901.
Gross earnings.....	\$45,613,125	\$42,369,013
Operating expenses.....	30,196,895	27,977,503
Net earnings.....	\$15,416,230	\$14,391,509
Net income.....	15,850,544	14,566,192
Charges.....	6,210,086	6,383,035
Balance.....	\$9,640,458	\$8,183,157
Seven per cent. pref. dividend.....	3,235,288	2,998,181
Common stock dividend.....	3,612,813	3,089,112
Surplus.....	\$2,792,357	\$2,095,864

The changes in the various items of the revenue account between 1897 and 1902 may be summarized in the following figures:

Increase in miles operated.....	452
Increase in gross earnings.....	\$15,126,357
Increase in operating expenses.....	9,344,356
Increase in renewal and improvement fund.....	2,275,000
Increase in net earnings.....	3,507,001
Decrease in interest charges.....	1,278,661
Increase in preferred dividend.....	1,268,084

A leading reason for the relatively small change in the net receipts lies in the increase of \$2,275,000 in renewal and improvement charges, this fund being created by the company by large yearly appropriations out of net income to carry on all sorts of extraordinary improvements to the property, many of which, if not all, would have justification in being considered capital charges. Within this period also maintenance accounts have been increased in addition, by \$3,784,000; so that within this period \$6,059,000 of the larger gross receipts have been turned back into the property for its improvement. The charges to renewal and improvement fund have pretty steadily increased from \$200,000 charged out of income in 1897, reaching their highest figure in 1900, when over \$3,000,000 was appropriated in this manner. In the last five years these improvement and renewal charges have amounted to \$10,846,529.

The character of the work which this fund has enabled the company to carry out can only be referred to briefly, but an idea of its character and extent may be obtained in the following summary of the chief items of expenditure in 1902 provided out of the fund, and shown below:

Chicago track elevation.....	\$826,391
Third and fourth tracks.....	145,224
Reducing grades and improving line.....	2,144,632
Escanaba docks and terminals.....	618,554
New Mississippi River bridge at St. Paul.....	339,773
New bridge at La Crosse, Wis.....	118,684
Changing grade of branches.....	200,018

Total for above work..... \$4,293,276

The total expenditures out of the renewal and improvement fund in the year amounted to \$4,435,785; and on June 30 last after crediting to the fund the \$2,475,000 charged out of income in 1902, there was an unexpended balance of \$4,680,229. Large improvements of the general character of those indicated above still continue underway, probably not the least important part being the extension of the company's double-track.

Improvements charged directly to operating expenses in the past year for new work, including ballasting of lines not heretofore ballasted, constructing and replacing wooden and iron bridges, and similar work, amounted to \$1,230,801, bringing the total improvement expenditures of the company in 1902 out of income up to \$3,706,000, as shown below:

New passing and side tracks.....	\$378,888
Additional ballasting.....	110,151
New bridge work.....	272,210
New stations and buildings.....	337,811
Total extraordinary charges.....	1,230,801
Add renewal and improvement fund.....	2,475,000
	\$3,705,801

Even these appropriations did not exhaust the requirements of the management for the betterment of its property. Capital expenditures amounted to \$6,292,620; but the net charge to capital taken into the accounts was \$4,493,902; the difference representing miscellaneous income received in the year, such as premiums on sale of common shares, etc., and appropriated to write down the capital accounts; so that we have a gross sum of \$5,905,000 provided out of current operations and income, appropriated by the company last year for improvements and another sum of \$4,500,000 provided by capital funds. These latter charges included \$2,581,841 for new locomotives and cars; \$2,006,243 for new lines—the construction of 140 miles on three branches having been authorized.

The number of tons of revenue freight carried one mile was 3,990,048,676—an increase of 350,070,757, or 9.02 per cent. Revenue per ton per mile was .8400 cents—a decrease of .0215 cents, or 2.50 per cent. The average miles each ton of revenue freight was carried was 200.65 miles—a decrease of 1.45 miles, or .72 per cent.

Revenue freight carried per loaded car was 13,340 tons against 12,937 last year—an increase of 3.12 per cent. The number of tons of revenue freight per freight train mile was 254.25, against 236.55 last year—an increase of 7.48 per cent. The revenue from freight per freight train mile was \$2.136, as against \$2.038 last year—an increase of 4.81 per cent., thus showing a considerable advance in the economy of operation, despite the irregularity in certain classes of traffic.

Chesapeake & Ohio.—The report for the year ending June 30, 1902, is the third to appear since Mr. Stevens became President, and the fourteenth since the property was reorganized and taken in charge by the present management. The average mileage worked during the year was 1,618, as against 1,507 in 1901, and 1,476 in 1900, but the total increase since June 30, 1901, is 75 miles, of which the greater part represents acquisition by lease or stock ownership, and less than 20 miles is new construction—branch lines in Virginia and West Virginia. In fact, there have been no important changes in the main line since trackage rights from Lexington, Ky., into Louisville were secured in 1895, over the Louisville & Nashville. But the policy of the management has been to make permanent betterments of the existing route, in connection with the building and acquisition of short feeder lines into the West Virginia coal fields and elsewhere. The following table, derived from annual reports taken at three year intervals, beginning with 1890, when the company was beginning to get on its feet, after the reorganization, shows the steady gains, particularly of the freight traffic. The average freight train load has increased from 325 tons in 1896 to 511 and 509 tons reported in the last two fiscal years. Within this period, and with a decrease in the average ton mile revenue on all freight from 4.26 mills in 1896 to 4.02 mills in 1902, the revenue per freight train mile has increased from \$1.193 in 1896 to \$2.046 in the last fiscal year. Figures taken at three year periods follow:

	1890.	1893.	1896.	1899.	1902.
Miles worked.....	923	1,277	1,360	1,449	1,618
Freight train miles.....	4,431,430	5,227,072	5,649,444	5,891,825	6,271,443
Passenger train miles.....	1,925,597	2,668,922	2,508,916	2,689,868	3,081,822
Passenger-miles.....	71,560,114	118,505,564	99,864,173	130,190,058	146,048,685
Ton-miles.....	1,006,323,855	1,479,487,919	1,836,024,472	2,506,145,852	3,194,336,608
Gross earnings per mile.....	7.759	8.095	7.518	8.288	10.213
Operating expenses per mile.....	6.080	5.664	4.912	5.309	6.433
Net earnings per mile.....	1.679	2.431	2.606	2.979	3.780
Freight density (ton-miles per mile).....	1,090,275	1,158,565	1,350,018	1,729,569	1,974,250
Passenger density (pass.-miles per mile).....	77,530	92,800	73,429	89,848	90,265

Passenger traffic also shows steady gains, though it is natural from the character of the increased mileage of line that passenger-miles should not be quite in proportion to this increase, made up mainly of freight spur branches. The following comparison of traffic density with the Norfolk & Western, operating, as it does, in a similar field, is of interest.

	Chesapeake & Ohio. 1899.	1902.	Norfolk & Western. 1899.	1902.
Freight density (ton-miles per mile).....	1,729,569	1,974,250	1,583,550	1,879,494
Passenger density (pass.-miles per mile).....	89,848	90,265	46,030	60,391

With a net income for the present year of \$2,060,409, the sum of \$1,030,428 was deducted for "extraordinary expenditures," of which \$286,702 was spent for a new passenger station at Richmond, \$197,345 for 27 miles of new sidings and yards, \$126,280 cost of completing 50 miles of second track, above bond issue, and \$102,815 represented cash payment on Car Trust "A," for 25 locomotives and 1,000 cars. The company now has two car trusts on its hands, of which Car Trust "A" was made in August, 1901, final payment being due in 1911, and \$1,000,000 remaining unpaid at the present time. Car Trust "B" is an additional contract which has been made with the Girard Trust Co., of Philadelphia, calling for 25 freight locomotives, 1,000 50-ton steel gondolas, and 1,210 40-ton wooden box, gondola and flat cars, to be delivered between August and December, 1902. A net cash payment (after deducting certain credits) amounting to \$255,774, was called for August 15th last, and the balance of \$2,000,000 by issuing car trust series "B," with interest at 4 per cent., one-tenth of the principal to be paid annually.

During the current year, payments amounting to \$829,535 were made for rolling stock, of which \$600,028 was charged to operating expenses, \$140,677 to net income, and \$88,820 to capital. Exclusive of equipment leased in car trusts, 13,821 freight cars were owned on June 30, 1902, as against 13,314, the previous year. The number of locomotives owned available for service, remained unchanged at 403, but the tractive capacity was increased approximately 86,000 lbs. by filling vacancies with new engines.

The amount of capital stock outstanding is \$60,540,100, and on this capital stock, 1 per cent. was paid in November, 1901; more than double the amount of the dividend was charged off from the net income to "extraordinary expenditures," and the "extraordinary expenditure" fund, these items coming to a total of \$1,440,815. In 1900, when the first dividend was paid, with a dividend payment of \$605,278, only \$348,695 was applied as "extraordinary expenditure" for real estate and new equipment. If the sum spent in 1901 on betterment out of net income had been divided among the shareholders in addition to the dividend declared, the rate could have been over 3 per cent. It is evident, however, that the company has the intention of continuing the large appropriations for betterments. The President in his general remarks to the stockholders says "To put your lines

in condition for economical operation and to take care of increased business will require steady and constant expenditures from net income yearly." Below are further details of results of operation:

	1902.	1901.
Earnings:		
Freight.....	\$12,833,806	\$11,842,213
Passenger.....	2,954,919	2,826,813
Express.....	226,820	189,426
Mails.....	365,923	349,884
Miscellaneous.....	142,910	163,204
Gross.....	\$16,524,379	\$15,371,542
Expenses:		
Maintenance of way and structures.....	\$2,175,876	\$2,217,760
Maintenance of equipment.....	2,755,437	2,253,307
Conducting transportation.....	5,177,967	4,844,375
General expenses.....	289,213	250,437
Operating expenses.....	\$10,398,492	\$9,565,880
Net earnings.....	6,125,886	5,805,661
Income from other sources.....	136,431	149,925
Gross income.....	\$6,262,317	\$5,955,586
Interest, taxes, etc.....	4,201,908	3,953,690
Net income.....	\$2,060,409	\$2,001,897

Missouri, Kansas & Texas.—Though operating in the Southwest, where the railroads have been generally very prosperous in the past year, and although showing, in the annual report now at hand for the fiscal year to June 30, last, an increase in gross receipts of \$988,316 to a total of \$16,391,400, this company's directors do not make an altogether encouraging statement for the shareholders. In the first place, gain in gross receipts was more apparent than real, for there was an increase of 235 miles in average length of operated road, with a decrease of \$224 per mile in gross receipts. The report states that the decrease in receipts per mile was attributable to unfavorable crop conditions on the main line and on the new extensions. Loss in traffic from varying crop conditions, is less serious to the company than loss from competition of new lines, and extensions of old lines into its territory, both in Texas and on the northern divisions. This subject is discussed more di-

rectly than is customary in railroad reports to shareholders.

On June 30 the company worked 2,555 miles, an increase in the year of 75 miles. The management has recently entered into the most important plan of construction which has occupied its attention for some years, by taking steps to maintain its hold upon the region in the Indian Territory west of the main line, which, formerly dependent upon this road, has recently been invaded by extensions of the Rock Island, the Atchison, and the St. Louis & San Francisco. This new line is to be 275 miles long, extending to Oklahoma City and Guthrie, and will give the company the shortest route from these towns to St. Louis and Kansas City, as well as to Chicago.

New equipment included 37 locomotives, 36 passenger train cars, and 1,533 freight cars, while 33 engines, 50 coaches and 100 ballast cars are now under contract. For this equipment the company has had no available capital funds, and its cost has been met by equipment notes, payable out of income, or by direct appropriations. The income accounts for the last two years follow:

	1902.	1901.
Miles operated.....	2,500	2,265
Gross earnings.....	\$16,391,399	\$15,403,083
Expenses and taxes.....	11,871,564	11,134,146
Net earnings.....	\$4,519,835	\$4,268,937
Other income.....	38,813	38,136
Total income.....	\$4,558,648	\$4,307,073
Interest and rentals.....	3,644,708	3,507,157
Surplus.....	\$908,940	\$799,916

The surplus is equal to 4 per cent. on the outstanding preferred shares, and a small balance of the common stock, but the company pays no dividends.

TRADE CATALOGUES.

Profiling Machines.—The Pratt & Whitney Company send us a pamphlet describing profiling machines. Entirely new designs are shown of one-spindle and two-spindle machines. The illustrations and descriptions in the pamphlet are sufficient, and pamphlets may be had on application to the company at 136 Liberty street, New York City, or at their offices in half a dozen other cities.

"That no scale shall form in boilers" is the unique title borne by a pamphlet issued by the Harrison Safety Boiler Works, Philadelphia, Pa. Under this title are set forth the merits of the Sorge-Cochrane system for the heating and thorough purification of boiler feed water. Another pamphlet accompanying the above is "Economy for Collieries." It explains in detail how the boiler feed water may be improved, a considerable saving in fuel effected, the steaming capacity of the boilers increased and hot water be delivered to the boiler by the use of the Cochrane "open" type of feed water heater and purifier. A list of large and well-known collieries is given, having in use all the way from 700 to 8,000 h.p. each of Cochrane heaters. It is said that the Sorge-Cochrane system is now heating and purifying water for over 300,000 h.p. of boilers.

Six-Wheel Switcher—Lake Shore & Michigan Southern.

An unusually heavy six-wheel switch engine is shown by the accompanying engraving. It was designed for heavy yard service on the Lake Shore & Michigan Southern Railroad and was built at the Pittsburgh works of the American Locomotive Company. The total weight of the engine, all of which is on the drivers, is 130,700 lbs., and the total heating surface is 1,982.4 sq. ft. The cylinders are 19 in. x 26 in. The maximum starting pull is 26,000 lbs., or one-fifth of the adhesive weight. A general description follows:

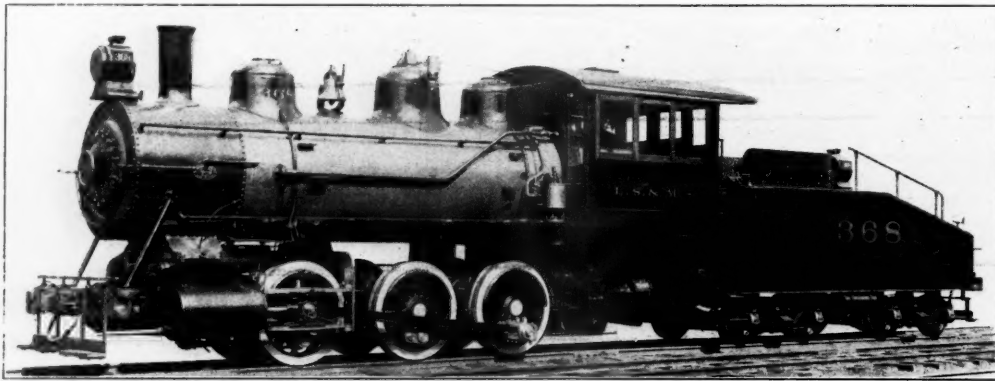
Weight on drivers	130,700 lbs.
Weight, total	130,700 lbs.
Weight, tender loaded	78,100 lbs.

General Dimensions.

Wheel base, driving	11 ft. 3 in.
Height of stack above rails	14 ft. 1/2 in.
Heating surface, fire-box	141.9 sq. ft.
Heating surface, tubes	1,840.5 sq. ft.
Heating surface, total	1,982.4 sq. ft.
Grate area	23.23 sq. ft.

Wheels and Journals.

Drivers, number	6
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Six-Wheel Switching Engine for the L. S. & M. S.

Drivers, diameter	52 in.
Journals, driving axle, size	8 3/4 x 10 in.

Cylinders.

Cylinders, diameter	19 in.
Piston, stroke	26 in.

Boiler.

Boiler, type of	Straight top
Boiler, working steam pressure	170 lbs.
Boiler, diameter of barrel	64 in.
Crown sheet stayed with	Radial stays

Fire-box.

Fire-box, length	6 ft. 7 3/8 in.
Fire-box, width	3 ft. 6 1/4 in.
Grate, kind of	Rocking

Tubes.

Tubes, number	244
Tubes, outside diameter	2 in.
Tubes, length over sheets	14 ft. 6 1/8 in.

Tender.

Tank capacity for water	3,500 gal.
Coal capacity	7 1/2 tons
Type of truck	Diamond frame
Type of tank	U, sloping

The Traveling Engineers' Association—Abstracts of Papers.

Elsewhere we print a pretty complete report of the recent convention of the Traveling Engineers' Association, held in Chicago. Below will be found short abstracts of the papers which were presented.

The Best Method of Drafting Locomotives for all Kinds of Fuel, Stack Included.

The committee sent out a circular asking the following questions and abstracts of the replies appear in the report, with several cuts. The conclusions of the committee are all that we can give here:

1. Please state kind of front end used on your road, whether Master Mechanics' standard, modified Master Mechanics', or whatever kind it may be. Please send sketch of same.
2. What is your method of increasing or decreasing draft on fire? How do you make fire burn evenly over grate surface? If by adjusting diaphragm, please state your method.
3. Where draft pipe and sleeve or double draft pipes are used, can they be adjusted to increase or decrease draft on fires? If so, how? Also, can you make fire burn evenly by adjusting draft pipes? If so, how?
4. Is one length of exhaust pipe used on all engines or do you aim to have top of nozzle at a certain location for each size of shell?
5. What method is used to insure having exhaust pipe, draft pipe and stack in line, in shop or roundhouse; also state what effect has exhaust pipe, draft pipe or stack out of line, on the steaming qualities of the engine?
6. Are the best results obtained when the fire burns evenly on the grates, or if most coal is consumed on back part of grates?
7. State kind of coal used on your road, size of engine and diameter of nozzle used in same.
8. State kind of stack, whether taper or straight, and what are its proportions to size of cylinder; also give reasons as to why you prefer either kind of stack, as the case may be.
9. Do you use single or double draft pipes, and say why; also give dimensions of pipes for different sizes of shell and cylinder.
10. Do you have any difficulty in getting the same results with same device on low or high pressure of same dimensions, also wide fire-box engines?

Question 1.—On the Michigan Central we use a modification of the Master Mechanics' front end.

Question 2.—The draft may be increased slightly by raising the bottom draft pipe or by lowering top pipe or sleeve, as it is sometimes termed. Raising the diaphragm causes the fire to burn more at the back end of the fire-box or creates a stronger draft through the top flues; lowering the diaphragm has the opposite effect. In getting a new engine ready for the road we adjust the draft pipes so that the bottom pipe will be from 1 1/2 to 2 in. above the exhaust tip, the top one about 3 in. below the base of smokestack and 1 in. between the pipes. We adjust the diaphragm to make the fire burn evenly and then if the draft is not sharp enough we change the positions of the draft pipes as mentioned. If this does not

make the draft sharp enough, we decrease the size of opening in the exhaust nozzle. The proper alignment of exhaust pipe, draft pipe and stack are looked after each time that the front end is examined.

Question 3 has been pretty well answered in No. 2, but we have not been able to make the fire burn evenly by adjusting the draft pipes; this is done by the diaphragm, as mentioned in Question 2.

Question 4.—On our Class R engines, as shown on Fig. 7, the combined length of exhaust pipe and nozzle is 25 in. In the W Class, Fig. 9 (Schenectady compounds), the exhaust pipe and nozzle are of the same height, 25 in. Both arrangements give excellent results.

Question 5.—To insure having exhaust pipes, draft pipes and stack in line, we face off both ends of the exhaust pipe, taking care to have the joint at cylinder saddle leveled, then when the nozzle is faced off we set a device, Fig. 8, which is made to fit all sizes of nozzles, in the top of nozzle tip. This device has an adjustable arm and by turning this around in the stack we are sure that it is set perfectly in line. The draft pipes are lined up in the

same way. The draft pipe or stack out of line with the exhaust pipe has a very detrimental effect on the steaming qualities of an engine from the fact that the exhaust steam escapes in a straight line and if the stack or draft pipe is out of line, the exhaust will strike the side of stack or pipe and this contact will retard the speed of the exhaust, lessening its capacity of induced action and entraining the gases, with the result that the vacuum is lower than it would be if the proper alignment were made.

Question 6.—The best results are obtained when the fire burns evenly all over the grates or slightly more at the back part of the fire-box.

Question 7.—We use Pennsylvania and Ohio bituminous coals. For 19 x 24 in. cylinder, same as shown in Fig. 7, we use 4 1/4-in. nozzle, and for 21 x 26 in. cylinder we use 5 1/4 and 5 1/2-in. nozzle.

Question 8.—The kind of stack used in Fig. 7 is known as the "boot leg" or taper stack. These stacks have a choke of 14 in. The stack for Figs. 9 and 10 are necessarily short, owing to the large size of smoke-box and are straight.

Question 9.—We use double-draft pipes, as shown in Figs. 7 and 9, and they vary in proportion to the size of the engine from 10 to 14 in. in diameter. The design shown in Fig. 10 has given excellent results in large engines with 21 x 26 in. cylinders, 71 in. diameter smoke-box shell, but as it is a new device and only put in use a short time ago, we are not yet able to point out its advantages.

Question 10.—We do not have any difficulty in getting same results with same device on high or low-pressure engines or wide or narrow fire-boxes.

It is very important that all roads should have a standard adjustment for the draft appliances on each class of engine and when the engine comes out of shop these appliances should be set according to standard. This standard, of course, should be arrived at by careful study of results and if engine is reported as not steaming we first see if these appliances are properly placed; if so, we examine the steam pipes and exhaust pipe for leaking joints and, if air-pump exhaust pipe is in front end, we see that all joints in it are tight or that cinders have not cut a hole in it; also see that flues are not stopped up, that grates are clean, that cylinder packing and valves are not blowing and as a last resort we reduce the size of opening in the exhaust nozzle. We aim to have as large a nozzle as possible and have a free-steaming engine.

As to smokestack, the Master Mechanics in their experiments of 1896, decided that the choked or boot-leg stack gave the best results. This, no doubt, is correct when using a stack 50 in. or more in length on a smoke-box shell of 60 in. diameter and with exhaust nozzle about 35 in. from base of stack, but on our large modern engines, with a short stack and the exhaust tip from 35 to 45 in. from base of stack, we believe that the straight stack is equally effective. We find that some roads are using a 15-in. choked stack on large engines with 21 x 26 in. cylinder and 70-in. smoke-box shell. This, we believe, is too small; much better results would be obtained with a straight stack of at least 18 in. diameter. We believe that the impression that the exhaust should fill the boot-leg stack at the choke is not correct in any respect. Any kind of stack should be large enough so that the exhaust will not strike or impinge on its sides, or at least not until it reaches the top. In other words, the stack should be just large enough so that the exhaust will not

strike until it reaches the top. The greater the distance between the exhaust nozzle and base of stack the larger the smokestack must necessarily be to allow for the spread of the exhaust without impinging on its sides.

We find that the lowest nozzle produces the greatest vacuum—other conditions being in proportion—and also tends to lessen the back pressure, or in other words, the efficiency of the low nozzle is greater than that of the high.

The report is signed by Messrs. D. Meadows, J. D. Benjamin, J. A. Baker, W. E. Widgeon and H. S. Hunter.

What Qualifications Should a Man Possess to Fill the Position of Engine Inspector?

There are different opinions among operating officers as well as among the men who run the locomotives, as to which of these men make the best inspectors. Naturally we would incline to the opinion that an engineer who has been specially trained in the inspection of engines for his own safety in long years of experience, would, when assigned to this particular duty, give better service than the new man who must be educated to it. Against this opinion we have nothing to say, but others hold the opinion that a young man should be specially trained for this work.

To speak of the qualifications necessary for an inspector, we might say that in the first place he must have good eyesight, be nimble and able to get about quickly so as to get in and out of the pits. He must not only have good eyesight, but good hearing, as from the sound of many parts when struck by a hammer he can judge as to whether they are broken or whole; but keenness of vision is a very necessary qualification, as engines are usually inspected in the roundhouse over a pit where the light is not the best, depending on the use of a torch to help out the poor light and show back in the corners behind the eccentrics to examine wedges, wedge bolts and the cracks which start in the frames around the driving boxes. Time is an important element in any inspection. The number of engines which a man can thoroughly inspect in a day measures his value, as engines may come in at irregular intervals, thus crowding him with work at one time and allowing him lots of time at others.

Inspection must necessarily be done over a pit in order that the inspector can get under the machine and this usually means a pit in the roundhouse, although an outside pit would doubtless be appreciated by the engineer who inspects the machinery at the end of a trip.

If the inspector and engineer should confer with each other as to the condition of the machine it would no doubt help the service. As long as they work in harmony the interchange of opinion would be beneficial.

Letters on this subject from several members of the Association were included in the report. Some difference of opinion was expressed as regards the men best suited for inspectors' positions, though in the main the ideas were in agreement. One writer expressed the opinion that there should be an age limit, placed between 25 and 40 years, as the ambition of a younger man tends to keep him keyed up to his work. He should be a man of experience as a fireman or engineman and should be a reader of one or more of the railroad journals. He should have a knowledge of the various special appliances on a locomotive, such as injectors, brake apparatus, lubricators, etc. He should also be familiar with several types of compound engines and should know something of the causes of valve gear derangement.

It was generally agreed that inspectors should have a "seeing eye" and should be systematic. Also that the compensation they receive should be sufficient to hold a good man. The practice of making inspectors of "pensioners," regardless of their qualifications, was condemned. A superintendent of motive power suggested the use of special apprentices for this work, as being good training for the men and insuring satisfactory inspection. Another writer disapproves of the talkative workman, saying the inspector should be a man of quiet disposition, careful and not afraid of work.

The report is signed by Messrs. C. P. Cass, chairman; Clinton Decker, E. W. Brown, J. R. Belton and Thos. Meehan.

What is the Best Method of Securing Complete and Intelligent Reports of Work Needed on an Engine?

The following questions were sent out by circular to all members to get an opinion upon which to base this report:

1. What kind of reports do you expect from engineers?
2. What inspection do you require of engineers and do you have engine inspected after the engineer's inspection?
3. What kind of blank reports do you furnish for making work reports on?
4. Do you hold engineers for any defects not reported and found by the inspector?
5. Do you make any test of engine before going out (or on arriving) for blows and pounds? This is for engines in the pooling system.

From the various replies to question No. 1, it is the general opinion and is expected that engineers should make full and complete reports of all defects that may be on engine. Some roads expect engineers to get under engine and inspect all parts. Your committee thinks also that the engineer should be held responsible for all defects to engine, providing, of course, if he has run her over the division. This is not to include leaks in fire-box and flues.

2. It is the general opinion from reports that the engineer is expected to thoroughly inspect engine. This is more imperative with engines that can be gotten under

readily. Engineers should be required to inspect their engines at terminals, where practicable.

The committee would recommend that regular engine inspectors be provided to inspect all parts, this to include the brake apparatus, after the engine has been turned over at terminals.

3. Copies of blank reports from various roads were included with the report.

4. The general opinion about holding the engineer for defects not reported and found by the inspector is that it should be done only to a certain degree. But your committee would recommend that some form of discipline be carried out to overcome the possibility of a careless engineer going unpunished. And any defects found by the inspector that should have been noticed by engineer be reported to roundhouse foreman and he take such action as may be deemed necessary.

5. The testing of engines for blows of any description is a very important item and is something that should be given careful consideration, as pounds weaken the power and sometimes cause serious delays. Your committee would recommend that where engines are in the pool that they be tested by the roundhouse force for packing and valve blows.

Engineers running regular engines of any description should be held responsible for all blows and pounds. As some blows are very deceptive, all concerned should understand or be taught to understand how to locate them.

The report is signed by Messrs. F. O. Miller, chairman; L. F. Bachman, D. M. Pearsall, W. N. Case and R. D. Davis.

Air-Brake Instructions to Prevent the Ruin of Wheels by Skidding and Handling of Air-Brakes on Freight Trains.

At this date there is no device on railroads of more importance than the automatic air-brake. Uniform piston travel is a very important factor in preventing wheels from sliding and until all cars are equipped with a good slack adjuster we would recommend that all brakes be tested before leaving a terminal, and the pistons adjusted to have a uniform travel. Not only does unequal piston travel cause said flat wheels, but it is oftentimes the cause of trains breaking in two, due to a short piston travel on rear of trains; this will apply to both freight or passenger where the trains are very long. The shortening of a piston, travel to 4 or 5 in. will increase the braking power from five to six per cent. There has been considerable said in regard to the number of applications that should be used in stopping trains, particularly passenger trains, to prevent sliding of wheels. Stopping a passenger train with one application makes the chances for skidding wheels much greater than where two applications are used.

Referring to the Westinghouse high-speed brake, we find that we get a heavy pressure when running fast and a lighter pressure when the speed of the train has been reduced. Making use of the principle of the high-speed brake in bad weather, such as a frosty morning or where there is a muddy crossing close to the stopping place, it is better to use two applications, for it is at the slow rate of speed where the danger of sliding wheels comes in. We do not recommend two applications for freight service.

The New York Central is equipping all passenger engines and cars with the high-speed brake, and has at the present time several trains running so equipped. It is very seldom a wheel is found to be flat. The engineers are instructed to use two applications when making a service stop with the high speed equipment. They are also instructed to use two applications on all through main-line trains. In suburban service they are instructed to use but one application. Sand is a valuable factor to prevent wheels from sliding and also in shortening the length of stops. Especially is this true where the rail is greasy and the speed is low, but it should be started to flow before the brakes are heavily applied and speed of the train reduced, and continued up to a stop. This also applied to all trains. In suburban service there is not the danger of sliding wheels as on through trains for the reason that the stops are so close together the speed of such trains cannot, as a rule, get up so high as a through train, where the stops are from 20 to 150 miles apart. Therefore, should the engineer make a total service reduction of 20 lbs. the train would be stopped in such a short distance the friction between the shoe and the wheels could not overcome that between the wheels and rail in time to slide them and do any damage. While the two applications will overcome the sliding of wheels due to short piston travel or bad rail, also to high leverage, there are other things which may exist that the two applications cannot overcome. The committee on looking into this subject came to the conclusion that when wheels are flattened they are either slid on sand or slid a considerable distance. That is, the wheels slide, as they frequently do, a few feet at the latter end of a stop; it is not such sliding that ruins them but it may be due to one of the following things:

First. In winter weather the shoes may be frozen to the wheels. This is caused by the brake being applied in order to hold the car in yard or on siding when out of service. If such a car should be moved without loosening the shoes from the wheels, without a doubt it would result in flat wheels. The committee would recommend that in order to remedy this difficulty the trainmen be required to watch all wheels on trains pulling out of yards or side tracks where cars have been standing in winter weather.

Second. A pressure retaining valve may be cut. There have been cases where trainmen would hear a blow com-

ing from the retainer exhaust port and in order to stop it they would plug it up or turn the handle crosswise, which would cut it in.

Third. A main reservoir capacity lacking sufficient volume to increase train-pipe pressure over the pressure in the auxiliary reservoir on rear of long trains fast enough to prevent the air from feeding by the packing ring of the triple piston from train-pipe into the auxiliary reservoir, when the rings and bushing are somewhat worn. This can be remedied to a great extent by using a large main reservoir and keeping it well drained of all water and instructing engineers about the length of time to leave the brake-valve in full release. The triple valves should be examined and cleaned about every six months. By so doing any defects, such as a worn bushing, worn packing ring or defective emergency parts, will be discovered in time to save trouble. Another cause is the exhaust port of the triple freezing over where the pressure retainer is not in use. To prevent this use a nipple L in the exhaust port, having it point downward.

Fourth. Connections caught or bound. This can be overcome by having the brakes properly inspected before leaving terminals.

Handling of Air-Brakes on Freight Trains.—First to consider is good judgment on the part of the engineer, for in handling trains in freight service there are many things to contend with that we do not have at all in passenger service, such as longer trains, which means a greater amount of slack, also more leakage, a greater inequality of piston travel, unequal braking power, due to light and heavy loading of cars, as partly air-braked trains. Taking all things into consideration, it is obvious that it requires skill and good judgment on the part of the engineer to handle long freight trains successfully. To begin with, the engine should be equipped with a good brake apparatus, for it has been demonstrated that the braking power on an engine weighing 132,000 lbs. on drivers and an empty tank, weight about 38,000 lbs., is equal to the brakes on about seven cars of 30,000 lbs. light weight. To insure its satisfactory operation the engineer on the incoming trip should make a thorough inspection of all parts, reporting all disorders. At such points there should be competent air-brake inspectors, and repairmen to do all work reported. The engineer on the outgoing trip should also give the engine the proper inspection in order that he will know that the apparatus is in proper condition.

When backing on to the train the maximum main reservoir pressure should be had and a reduced train-pipe and auxiliary reservoir pressure. After train has been charged and a signal to apply brakes has been given the engineer should make a reduction in service of about 7 or 8 lbs., when the handle of the brake-valve should be placed on lap position and left there until the train line exhaust ceases.

The engineer should note the length of blow that comes from the train-pipe after lapping the valve to determine about the length of the train-pipe. He should also carefully note the manner in which the equalizing discharge piston cuts off or seats as he can determine the condition of the train-pipe in regard to obstruction in same. The reason for recommending this is to give the engineer an opportunity to know the condition of his train while in service. By comparing an equal discharge while out on the road from that made in the yard, he can about determine whether conditions are the same as when making the terminal tests. Should the blow be shorter when making the initial reduction the engineer must be careful in making the stop, as he will know the train-pipe is much shorter than when making the terminal test, and must govern himself accordingly. After the above reduction has been made and condition of the exhaust noted he must now proceed with the reduction until a total of about 20 lbs. has been made. After brakes have been inspected and a signal given to release, the brake valve should be placed in full release position and left there long enough to insure that all brakes have been released, when the valve should be moved to running position.

The engineer should use judgment in regard to how long the brake valve should remain in full release position, but in no case should it remain long enough to overcharge the train-pipe. Brakes should always be tested after setting out or taking on cars. The safety of the train and our lives as well as depending on the brake. Before starting get all the information possible in regard to conditions of train.

Applying Brakes in Service.—In making a service stop with a long freight train, ample time should be allowed after shutting off steam for the slack to run in before applying brakes, for the reason that if the initial reduction should be a little heavy and a brake on the head end of train should have a short piston travel, the slack running in would cause a severe shock to the train, since inequality of piston travel is common in freight service. The engineer must exercise good judgment both in applying and releasing brakes. The first reduction should not be made too heavy, for if there should be a brake on rear of train with piston traveling say 4 or 5 in., that brake would apply much harder than the longer travel and the slack running out would without a doubt break the train in two. Then again the initial reduction must not be made too light, due to the leakage groove in the brake cylinder; if the piston is not forced by the groove all the air that goes to the cylinder would leak by the piston to the atmosphere, which would result in a loss for that reduction. Ordinarily from 5 to 7 lbs. will give the best results. The committee would recommend not less than 5 or more than 8 lbs. for the initial reduc-

tion. After the initial reduction always wait a few seconds before making the second to allow slack to run out should there be a short piston travel on rear of train. The amount of the first reduction will depend somewhat on the length of train as the gage is the only means by which the engineer can tell as to the amount of reduction he is making, and it being connected to the equalizing reservoir, it depends to a very great extent on the condition of the packing in the equalizing discharge piston as to about how much of a reduction will leave the train-pipe. In making a service application the equalizing reservoir pressure is reduced, when the duty of the equalizing discharge piston is to regulate the amount that leaves the train-pipe. A heavier first reduction is necessary with a long train than with a short one since the volume of air in the equalizing reservoir is constant regardless of the length of train-pipe; therefore a reduction from chamber D (any given amount) can be made in practically the same time.

The volume of air in the train-pipe increases directly with its length, so that the longer it is the more time is required to make a reduction. Since train-pipe pressure reduces more slowly on a long train than on a short one, there is a greater chance for auxiliary reservoir air to feed back into the train-pipe through the feed groove before it is closed by the triple piston. This reduces auxiliary reservoir pressure and has the same effect as though the first reduction had been light. It is obvious that the slower the train-pipe pressure is reduced the slower will the auxiliary reservoir air go into the brake-cylinder and consequently more air will leak through the leakage groove by the packing leather.

Always watch the air gage as closely as possible and never make over a 25-lb. reduction in making a stop in service, for if the piston travel is correct you will have full braking power with about 20 lbs. reduction, when any further reduction would be a waste of air. In all cases of emergency place the brake valve in emergency position and leave it there until train comes to a stop.

Releasing Brakes.—Never release brakes in running position with the mistaken idea that you will "just kick off a few," for it is just such foolishness that causes many flat wheels, also causes trains to break in two. When the valve is in running position the opening from the main reservoir into the train-pipe is much smaller than when in full release position; therefore, the increase of train-pipe pressure is comparatively slow. And if there should be a leaky triple piston packing ring or a short piston travel on rear of train, breaking in two of train is very liable to occur. To release brakes always use the full release, for it is the suddenness with which the train-pipe pressure is increased that gives a sure and prompt release. It has been found to be good practice if the train-pipe pressure has been reduced say 15 or 20 lbs. on long trains never to release brakes until train comes to a stop. Should you release brakes while train is moving, never open the throttle until you are sure all brakes have released and the slack has adjusted itself. If you should, you are almost sure to break the train in two. In taking water with a freight train it is always best to stop short of the water plug, cut off and run up with the engine alone. Trains are sometimes stalled by the brakes applying when running along, due to the engineer throwing the handle of the brake valve to full release and bringing it back to running position; by so doing he gets the train-pipe charged higher than what the feed valve is set for so that when in running position the brakes are liable to apply. The train-pipe pressure must be reduced below what the feed valve is set for before it will open and allow main reservoir air to enter train-pipe.

When descending heavy grades always try to keep the train-pipe and auxiliaries charged to as near the standard as possible by recharging as often as may be required. The only secret in handling trains on heavy mountain grades is to keep the speed low, when the train can be handled with light applications. Always recharge in full release position. If it appears that the train-pipe pressure will be too high before it is necessary to again use the brake, return the valve handle to running position when the standard pressure has been obtained.

In order to handle freight trains successfully on mountain grades or on level track where trains are long, a large main reservoir capacity is very essential, having nothing less than 40,000 cu. in. capacity; 60,000 is better.

The committee would recommend the duplex pump governors to be used on freight engines with the improved "92" pattern of engineer's brake valve, one of the governors being connected to the main reservoir pressure and set at 120 lbs. and the other connected to the feed port in engineer's valve, from rotary valve to feed valve attachment and set at 90 lbs.

This would give a pressure of 90 lbs. for the pump to work against when running along, while maintaining train-pipe pressure. When the brakes are applied the pressure in the port from the rotary valve to the feed valve will be quickly reduced through leakage in governor, attached to this port. The pump will be permitted to accumulate pressure in main reservoir to what the high pressure governor is set for.

With large main reservoir capacity and a high excess pressure the rear brakes can be released more promptly and train-pipe charged much quicker than where a small capacity main reservoir and low excess pressure is carried. It is the rear brakes on long trains not releasing and slack running out with these brakes acting as anchors that cause trains to break in two.

This report is signed by Messrs. W. H. Foster, chair

man; Otto Best, J. A. Kershaw, T. A. Hedendahl and C. P. Lovell.

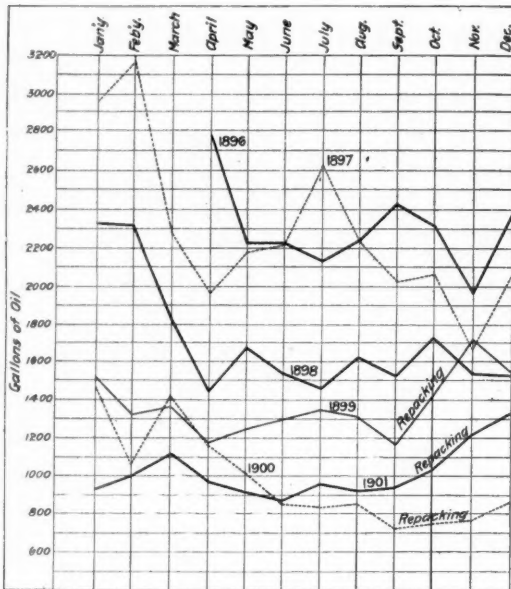
The papers on "Oil Fuel Tests" and "Handling Compound Locomotives" will be printed in a later issue.

Economy in the Use of Oil.

BY S. J. DILLON.

The subject of lubricating journals under passenger equipment cars is an inexhaustible one and has been much and ably discussed in the papers and by railroad clubs, but there is much yet to learn as to the best practice in packing journal boxes in order to obtain entirely satisfactory results and freedom from hot journals.

To obtain economical results there should be a uniform method of taking care of journal boxes in the several yards of any large railroad system, but so far as the writer has been able to observe each yard foreman seems to have a system of his own, which he regards as very much superior to his neighbors. The only way to bring about a uniformity in practice is for the Mechanical



Record of Oil Consumption at Large Passenger Yard.

Superintendent to call together the yard foremen or representatives at the different yards, and from this discussion to be able to demonstrate which is the most satisfactory practice to follow, and when adopted, printed or type-written instructions should be furnished each yard and placed in a conspicuous place where the men who are responsible for the care of the boxes can read it and re-read it.

The experts employed by the Galena Oil Company have rendered valuable services in establishing a uniformity in practice in packing and lubricating journal boxes, and their recommendations have been accepted as good practice on a very large number of railroads.

The men who take care of the journal boxes should be intelligent and reliable men. The oil house and its accessories should be kept in a neat and clean condition. The instructions to the men should be plain and where possible accompanied by intelligent drawings or diagrams demonstrating the practice to be followed. Examples of defective brasses which had given trouble on the road should be exhibited in the oil house for the information of the men.

A complete record should be kept of the hot journals occurring in the territory for which the oilers are responsible, and each hot journal which is chargeable to the oiler marked up against his record in the oil house, where it is constantly before him. The oilers should be called to the office of the foreman at least once a month and their attention called to any increase in the oil consumption or hot journals, also some appreciation should be shown for any saving in the oil consumption accompanied by a decrease in the number of hot journals. This will command the respect and co-operation of the men, whose individual efforts must be depended on to obtain satisfactory results.

The management of the railroads are constantly calling the attention of subordinate officers to the importance of economy in the use of lubricating oils, and in no way can satisfactory results be obtained and maintained except by the constant and scrutinizing supervision of the head of the department by placing before the men instructions and examples which will tend to educate them in their work, which is doubly advantageous, because it helps men to greater intelligence and ability, and in doing so it brings into operation influences which make them feel that the result of their work is appreciated by the company.

It was observed in one of the large railroad passenger yards at Jersey City taking care of more than 3,000 journals daily, that the oilers in the aggregate were using a large quantity of oil, and yet hot journals were quite numerous, especially on the fast express and mail trains. A record was then kept in the oil house of the quantity of oil used by each oiler, and it developed that the men who used the most oil had the greatest number of hot journals. These men were removed, and either left the service or were placed where their services were of more use

to the company, and almost immediately there was a decrease in the number of hot journals, accompanied by a large decrease in the oil consumption.

In one particular service where it was impossible to get trains over the division in both directions without serious detentions from hot journals when oiled at both ends of the road daily, after making the changes with the men and innovations in the practice, these same trains ran and are now running, with almost absolute freedom from hot journals, and they are oiled but once a week, the waste and brasses being inspected daily.

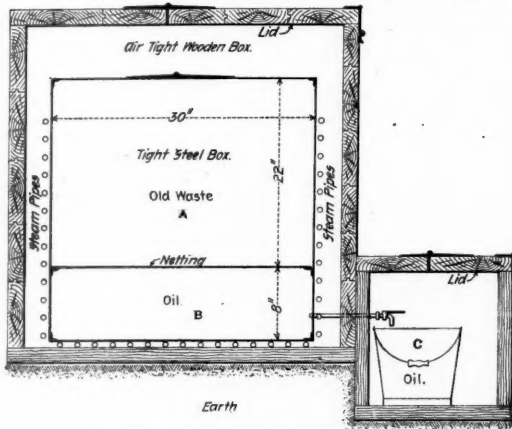
The writer has refrained from saying anything about the quality of the oil, as it is not a factor in the problem, as we all use Galena oil, and we are more concerned in obtaining good results from what we have and maintaining the waste and brasses in good condition. No matter how good the results may be, it is fallacy to relax supervision and assume that the standard of practice and efficiency which has been established will be maintained.

The accompanying diagram is a record of the oil consumption in one of the large railroad passenger yards at Jersey City handling a very large number of cars, some of which make 2,000 and more miles before returning to the starting point.

The use of Galena oil was commenced in April, 1896, and in January, 1899, the writer took a personal interest in the matter of lubricating and taking care of journal boxes, and after inaugurating the system outlined, it will be readily seen on the diagram that there was a large decrease in the oil consumption. The rise in the consumption line commencing October of each year 1899, 1900 and 1901, is due to repacking a large number of boxes, as during the summer months the packing accumulates a large amount of sand and dirt, and the summer oil when it is allowed to remain in the boxes in cold weather congeals, and the waste has a tendency to settle away from the journal and consequently necessitates more attention than the same boxes packed with waste saturated with the winter, or lighter oil.

The total consumption of oil for nine months in 1896 and years 1897 and 1898 was 68,397 gallons, an average monthly consumption of 2,073 gallons. The total consumption for the years 1899, 1900 and 1901 was 40,193 gallons, an average monthly consumption of 1,116 gallons. Taking the average monthly consumption of 2,073 gallons during 1896, 1897 and 1898, and multiplying it by 36 (the number of months in 1899, 1900, 1901,) = 74,628 gallons. Subtracting 40,193, the actual consumption for this period, leaves a balance or saving of 34,435 gallons.

A very important factor in the care of journal boxes is to see that none of the old packing removed is thrown away. All the old waste removed is accumulated and the oil extracted, which is used for soaking the waste. The accompanying sketch shows the device which is used for



Sectional Elevation of Oil Extractor.

extracting the oil by the application of heat, which leaves the waste perfectly dry, and in this condition the dirt or sand is easily removed. The waste is then resaturated and used again. The oil extracted in this manner is entirely free from dirt or grit, and, in fact, it is just as good as new oil.

This oil extractor consists of an air-tight wooden box of any desired dimension, inside of which is an oil-tight iron box with steam pipes built up on all sides. The old waste is placed in the iron box on the netting, and the oil falls into the space "B," from which it is drained off into a pail "C." The sketch is otherwise self-explanatory.

This device has proved very satisfactory, and is much better than the squeezing method, in which the dirt is squeezed out with the oil, which leaves it in a thick unsatisfactory condition.

The writer has shown that with ordinary care and attention a large saving can be effected in the use of lubricating oils and with a decided improvement in the service. During the period of reduction in oil consumption there was a very large increase in the car mileage, and the reduction in the cost of lubrication per 1,000 car miles was quite remarkable.

TECHNICAL

Manufacturing and Business.

T. F. De Garmo, 3116 Clifford street, Philadelphia, Pa., has been appointed eastern representative of the Falls Hollow Staybolt Co.

The J. G. Brill Co., of Philadelphia, has bought the

plant of the American Car Company, at St. Louis, Mo., at trustees' sale, for \$365,000.

The Consolidated Car Heating Company's system is to be used on the 20 simple passenger engines being built for the Chicago Great Western at the Brooks Works of the American Locomotive Co.

William Robertson, heretofore with the Grand Trunk at Chicago, resigned Sept. 15 to accept the appointment as General Manager of the Federal Supply Co., Auditorium Building, Chicago.

The Marion Steam Shovel Co. has just booked an order for eight large steam shovels, to be delivered to the iron mines in the northwest in the spring and summer of 1903. The company has recently delivered to the different mines in this section several large shovels, and has now more orders booked than at any time in the history of the company.

The Niles Car & Manufacturing Company has increased its capital stock from \$200,000 to \$300,000. Two more names were added to the list of directors. The directors are as follows: George B. Robbins, A. G. McCorkle, Wm. Herbert, B. F. Pew, C. P. Souders, A. A. Anderson, A. G. Webb, Dr. A. J. Leitch, George D. Kirkham, the latter being the new members.

The recent European negotiations of the Chicago Pneumatic Tool Co. have drawn especial attention to them in the industrial field and recall the modest beginning of the company a few years back. The great variety of successful pneumatic appliances made by this company is indicative of the energy and untiring efforts they have made to promote the various inventions coming under their control, and suggests the thought that while inventors are entitled to all due credit for their ideas, those who make a commercial success of the inventions are likewise entitled to their just share of credit. The enterprise of the Chicago Pneumatic Tool Co. in this latter connection has gained for them a considerable share of the pneumatic tool business of the world.

Iron and Steel.

It is said the Canadian Pacific is about to order 50,000 tons of rails.

The Sheet Steel Co., of Pittsburgh, is about to incorporate under the laws of Pennsylvania. The new company has leased the plant of the Tuscora Steel Co. at Newcomerstown, Ohio. The general office is in the Lewis Block at Pittsburgh, and Geo. A. McLean is President.

The Alabama Steel & Wire Corporation has filed a certificate of incorporation in Connecticut with a capital of \$5,000,000. Of the shares 25,000 are to be preferred stock and 25,000 common. E. T. Schuler and G. H. Schuler, of Birmingham, Ala., and Samuel I. Knight, of New York, are the incorporators.

A part of the new Clairton works of the Crucible Steel Co. of America was started up Sept. 8, and it is expected that the entire plant, with the exception of the blast furnaces, will begin operations in a few days. The two blast furnaces will be placed in operation early in December and January.

The advance sheets of the forthcoming annual report of James M. Clark, Chief of the State Bureau of Industrial Statistics of Pennsylvania, will show that that State made 1,406,532 gross tons of rails during 1901. The production of plate and sheets was 1,590,502 gross tons, including black plate and other sheets. There is an increase over 1900 of 1,065,943 gross tons of iron and steel rolled into finished forms, and 109 per cent. over 1896. Other rolled products, including structural shapes, bar and rods, billets, etc., amounted to 5,633,954 gross tons.

The Navy Department has let contracts for the supply of steel material to be used in building the new battleship "Connecticut" at the New York Navy Yard as follows: Class 1. Ship plates, the Carnegie Steel Company, \$179,007. Class 2. Nickel steel plates, Carnegie Steel Company, \$158,077. Class 3. Steel shapes, Carnegie Steel Company, \$78,489. Class 4. Steel castings, United States Steel Corporation, \$27,763. Class 5. Hull rivets (plain), American Iron & Steel Manufacturing Company, \$19,353. In each case the award was made to the lowest bidder.

The Pneumatic Signal Company's Contracts.

An officer of the Pneumatic Signal Company, which company, as our readers know, is now the owner of the Standard Signal Company, and the successor to its business, writes that two of the interlocking plants mentioned in the list of the company's contracts which was published last week (page 705) are to be equipped with low-pressure pneumatic apparatus. That at Livingstone avenue, Albany, on the Delaware & Hudson, is already well advanced. The other one is that at Forest Home, on the line of the Chicago Terminal Transfer Company. On this 32-lever plant the work has not yet been begun. The Forest Home contract was secured after the satisfactory completion of the extensive low-pressure plant at Harrison street, Chicago, which is described on another page of this issue. The 19-lever plant at Fifty-third street, New York City, is also pneumatic.

The Pneumatic Signal Company also controls the foreign companies making low-pressure interlocking apparatus, and it is about to consummate the organization of companies in France, Germany and Austria.

The Marshall Valve Gear.

Many statements have appeared pretending to be more or less official and authentic on the subject of the new

Marshall valve gear in test on one of the English lines. Some papers have even gone so far as to illustrate the plan of the motion and to describe it fully. Considerable harm will be done to the inventor should these be taken as official, and so far no authoritative statement has appeared. How long it will be before it does come is impossible to say.

"The Highest State of the Art."

The Union Steel Company of Pittsburgh will adopt electrical power distribution for its new mills. The power will be generated by the use as fuel of the waste gases from the blast furnaces, and will be distributed in the form of alternating current to rotary converters at the mills, where it will be used largely as direct current. The company has recently bought from the Westinghouse Electric & Mfg. Co. two 800-k.w., A. C. generators, one 800-k.w., D. C. generator, and five rotary converters.

The New York and Brooklyn Rapid Transit Tunnel. On Thursday of last week the contract was signed for building the tunnel between lower New York and Brooklyn, extending the new rapid transit line from New York across the river. It will be remembered that the Belmont-McDonald Company were the lowest bidders for this tunnel, having offered to do about eight million dollars' worth of work for two millions. The contract having been signed, it is fair to assume that the sub-contract for actual construction will soon be offered.

Car Lighting.

The Erie Railroad is now using on a number of day coaches acetylene gas made and used under the system of the Commercial Acetylene Company. In this system the gas is made in a suitable building at the terminal and is carried in tanks under the car, as in the case of other kinds of gas. A car fitted with the ordinary tanks will carry a sufficient quantity of gas for several thousand miles.

Alternating Current and Fire Insurance.

The Eureka Fire Hose Company of Jersey City, N. J., will discard its direct-current power transmission system and adopt an alternating current system to reduce the cost of fire insurance where motors are used in the presence of inflammable material. This step has been taken on the advice of one of the largest insurance companies of this country. The electrical equipment has been ordered from the Westinghouse Electric & Manufacturing Company.

THE SCRAP HEAP.

Notes.

It is reported from Le Roy, N. Y., that the Buffalo, Rochester & Pittsburgh is putting in a telephone line along its road. Apparently two of the existing telegraph wires are used, and the metallic circuit thus formed is to be used for telephoning and telegraphing simultaneously.

The City of Detroit has an ordinance requiring street railroads to have power brakes on their cars; and in a suit to impose a fine of \$50 for violating the ordinance the judge of the local court has sustained the city. The city may rightfully enact, under its authority to exercise police power, any reasonable law designed to protect the lives and limbs of citizens; and it is held that this law comes within that class.

The Hudson Valley (Electric) Railroad ran cars to Ballston, N. Y., on Monday last, after a suspension of traffic lasting 17 days. The strike which caused the stoppage appears to have been of the usual kind; new men employed by the company, and the officers of the law who protected them, were jeered at and threatened, and when the company finally got ready to start the cars, wires were found to have been cut.

The Coroner has reported on the trolley-car collision near Gloversville, N. Y., on July 5, when two cars were wrecked on the Mountain Lake Railroad and 14 persons were killed. The Coroner holds that Motorman Dodge, of the runaway car, who was killed, was responsible for the wreck through carelessness and incompetency. The company was censured for violating the railroad laws in employing incompetent help, and in not equipping cars with emergency brakes. It is said that cases against officers of the road will be presented to the October grand jury.

From a report which has been published of a meeting of cotton mill men which was held at Lowell, Mass., some weeks ago, it appears that the agreement between the cotton men and the Boston & Maine Railroad, under which the road restored through freight rates from the west, was probably based on an average free time of six days per car, the average to be taken monthly. That is to say, the cotton men agreed to pay 20 cents a day demurrage after the sixth day, and \$1 after the thirtieth day, but only on the net number of days due at the end of the month. If 10 cars should be unloaded on the day they arrived, there would be 50 car-days to the credit of the consignees, which would relieve them from the payment of demurrage on five subsequent cars which might be held 16 days each (10 days beyond the free time). A subsequent clause, however, appears to indicate that besides this agreement, the consignees also agreed to abide by the regular demurrage rules on bulk cars, which call for the payment of \$1 a day after four days, not including Sundays and holidays. Apparently this last clause supersedes the first one on cars unloaded from team tracks or from private sidings, while the 20 cent

clause applies to cars in any situation, whether at the freight house, or waiting in yards, or elsewhere, to be taken to the point of delivery.

Erie Commutation Tickets.

Conductors on the suburban trains of the Erie Railroad running into Jersey City are now using a new style of ticket punch, designed to more thoroughly guard against the use of commutation tickets for more than the stipulated number of trips. The commutation ticket of the Erie consists of a single card. The lower end of the card, a space about 2½ in. x 3 in., is filled with numbers from 1 to 60, each number representing one of the 60 rides for which the ticket is good. Heretofore, the practice has been for the conductor to punch a hole through a single number for each trip. This method of cancellation is unsatisfactory, because, in his hurry, the conductor often punches the hole a little to one side of the precise point where it should be to most effectively cancel the number; and because holes can be plugged. With the new punch an entire square is cut out in each case. If, for example, the figure 1, representing the first ride, is in the lower right-hand corner of the ticket, it occupies a square measuring, say, one-fourth of an inch, each way; this includes the figure and all of the margin around it that does not belong to the adjacent figures. The conductor cuts out this entire square. Thus when four rows of numbers have been punched, the ticket, instead of being, in its lower part, a skeleton, filled with a large number of holes of varied shapes, which a scalper can plug, is a symmetrically shaped card, as it was when new, except that it is an inch shorter. After another row is used up, the ticket is 1¼ in. shorter.

New Torpedo Boats.

The torpedo boat destroyer "Worden," built by the Maryland Steel Co., on her standardizing trial last week made an average speed of 29.86 knots and a maximum speed of 30.50 knots. The torpedo boat destroyer "Bainbridge," built by Neafie & Levy, of Philadelphia, made on her standardizing trial 28.72 knots average speed. The contracts for both boats called for 28 knots. The "Bainbridge" is 245 ft. long, 22 ft. 7 in. beam, 6½ ft. draft, and has a displacement of 420 tons. She is built of steel and has twin screws and 8,000 i.h.p. The "Worden" is of 433 tons displacement and 8,300 i.h.p.

Pneumatic Tube Service in New York.

The Post Office Department has authorized the New York Mail & Newspaper Transportation Co. to re-establish the pneumatic tube service in New York and Brooklyn, to cover the same route and to be the same in character as that in operation for the past four years, the price to be a pro rata of the rate named in the recent proposition of the company for existing and new lines. (Aug. 29, p. 677.)

State Freight Rates in Georgia.

The circular recently issued by the Railroad Commission of Georgia, reclassifying the railroads of the State into four classes, for the purpose of computing the rates for the transportation of freight over the several roads, is designed solely to reduce the number of classes from seven to four, and the few changes in rates which result are incidental. Classes 2, 5 and 7 are cut out, and the roads in these abolished classes are transferred into one or another of the remaining four classes, which are appropriately renumbered. The Atlanta & West Point, which was in class 2, now goes into class 1. The Atlanta, Knoxville & Northern is changed from class 4 to class 3. The other roads changed are all small ones. On the A. & W. P. the rates on the eight higher classes, and on some commodities, are reduced, but the lower class rates remain unchanged. The reduction, where made, is about 9 per cent. On the A. K. & N. there is a reduction in classes B, K, M and R. On the smaller roads the change increases the rates; they were 25 per cent. above the standard, and now are 50 per cent. above.

LOCOMOTIVE BUILDING.

The Central of New Jersey is in the market for engines.

The Louisville & Nashville is figuring on some new locomotives.

The Elgin, Joliet & Eastern is said to be in the market for a few locomotives.

The Queen & Crescent is having three locomotives built at the Baldwin Works for the Vicksburg, Shreveport & Pacific.

The Chicago, Lake Shore & Eastern has ordered four consolidation and seven switching engines from the Baldwin Works.

The Buffalo, Rochester & Pittsburgh is having 10 locomotives built at the Brooks Works of the American Locomotive Co., in addition to the order reported last spring.

The Pennsylvania has ordered 250 locomotives from the Baldwin Works for delivery in 1903. The class of these locomotives is not fixed, but it is probable they will all be for freight service.

The Terminal Rv. Association of St. Louis has ordered 11 simple six-wheel switch engines from the Baldwin Locomotive Works. These engines will weigh 136,000 lbs. on the drivers and will have cylinders 20 x 26 in.; 51 in. drivers, with a working steam pressure of 200 lbs.

F. M. Hicks has taken orders during the past week for locomotives rebuilt at the Hicks Locomotive & Car Works for the following concerns: La Follette Coal, Iron & Ry. Co., one consolidation; Arkansas Lumber Co., one switcher; Fort Worth & Denver City, four freight engines.

The Atchison, Topeka & Santa Fe order for 15 locomotives now building at the Baldwin Works will be of the Vauclain compound "Mikado" type. Total weight, 260,000 lbs.; weight on drivers, 200,000 lbs.; cylinders, 18 and 30 x 32 in.; diameter of drivers, 57 in.; wagon top boilers, with a working steam pressure of 225 lbs., and 463 iron tubes 19 ft. long and 2½ in. outside diameter; fire-box, 108 x 78 in., of steel; tank capacity for water, 7,000 gal.; coal capacity, 12 tons. Special equipment includes Westinghouse-American brakes on rear of drivers, hammered steel journals, Handy pivoted couplers on front, Tower couplers on rear; Pyle's electric headlights, Simplex injector, Paxton-Mitchell piston and valve rod packings, Crosby safety valves, Leach sanding devices, Nathan sight-feed lubricators, National springs, American graduated steam gages and Standard tires.

The Norfolk & Western has ordered 22 simple consolidation engines class W, of which 12 are to be built by the Baldwin Locomotive Works and 10 by the American Locomotive Co. at Richmond. These engines will weigh 170,000 lbs., with 150,000 lbs. on the drivers; cylinders, 21 x 30 in.; 56 in. drivers; extended wagon top boilers, with a working steam pressure of 200 lbs.; total

heating surface of 2,474 sq. ft.; 273 charcoal iron, lap-welded tubes, 2¼ in. outside diameter, and 14 ft. 6 in. long; fire-box of carbon steel, 9 ft. 4½ in. long and 5 ft. 4¼ in. wide; grate area, 47.3 sq. ft.; tank capacity, 6,000 gallons of water, and 10,000 lbs. of coal. Tire special equipment includes: Westinghouse automatic air-brakes; main nickel steel axles, others cast-iron; Magnesia sectional boiler lagging; Norfolk & Western standard brake-beams; steel brake-shoes; M. C. B. automatic couplers; Norfolk & Western headlights; No. 10 Monitor injectors; Brady metal journal bearings; U. S. metallic piston and valve rod packings; Ashton muffled safety valves; Leach sanding devices; Nathan sight-feed triple lubricators; A. French springs; Ashton steam gages; L. S. Co.'s cast-steel driving and truck wheel tires; steel cast-iron tender wheels, and main cast-steel wheel centers, others cast iron.

CAR BUILDING.

The Queen & Crescent has recently placed an order for coaches.

The Vandavia has ordered 54 gondolas from the American Car & Foundry Co.

The Canadian Pacific is reported in the market for 14 cars for passenger service.

The Alabama Lumber Co. is having 25 freights built by the American Car & Foundry Co.

The Copper Range has ordered 30 ore and 25 flat cars from the American Car & Foundry Co.

The Fort Smith & Western has ordered 50 box cars from the American Car & Foundry Co.

The Pennsylvania Coal & Coke Co. is having 400 freights built by the American Car & Foundry Co.

The Duluth & Iron Range is having 75 freights built by the Illinois Car & Equipment Co. at Hegewisch, Ill.

F. M. Hicks has sold during the past week 46 freight cars rebuilt at the Hicks Locomotive & Car Works to various companies.

The Boston & Albany will shortly order 25 cars for passenger service. The order will probably be placed with Osgood, Bradley & Co.

The Central of New Jersey is in the market for 1,000 wooden box cars with steel underframes, 1,000 steel coal cars and 500 steel gondola cars.

The Caswell Car & Improvement Co. of Chicago are reported to be in the market for 1,250 Caswell level-floor drop-bottom dump cars of 80,000 lbs. capacity.

The Kansas City Southern has ordered 75 tank cars of 8,000 gal. capacity, and 25 tank cars of 1,000 gal. capacity from the American Car & Foundry Co.

The Coal & Coke Co. (West Virginia) is having 400 freights built at the South Baltimore Car Works. This includes the order reported in our issue of June 6.

The Lake Shore & Michigan Southern is building five baggage cars at its Cleveland shops. These cars will be equipped with the Consolidated steam heating system.

The Hocking Valley has ordered five coaches from the Pullman Company for use on the Toledo & Ohio Central, in addition to the four reported in our issue of July 18.

The American Car & Foundry Co. has booked an order from the Cape Cruz Construction Co. of Cuba for 50 cane cars of special design. A few coaches are also being built at the Jeffersonville Works for the Lehigh Valley and the Vera Cruz & Pacific, and in addition the company has miscellaneous orders for 13 cars of various types.

The Canadian Northern order for box cars, for which contract was let last month, calls for 400 cars of 60,000 lbs. capacity for October and November, 1902, delivery, to be built by the Western Steel Car & Foundry Co. Length over end sills, 34 ft. 7½ in.; width, inside in the clear, 8 ft., to be built of wood with wooden underframes. Special equipment includes metal brake-beams, Westinghouse brakes, Buckeye couplers, Chicago grain doors and Batten side doors; M. C. B. standard draft rigging and journal boxes, pressed steel journal box lids, Pennsylvania W springs and Griffin wheels.

The Mexican Central has ordered nine second-class passenger coaches from Harlan & Hollingworth. The coaches will be 60 ft. long over end sills, 9 ft. 8 in. wide over side sills and 14 ft. high from rail to top of roof, and have wooden underframes. The special equipment includes: Hammond iron axles; plate bolsters; National-Hollow brake-beams; cast-iron brake-shoes; Westinghouse air-brakes; M. C. B. brasses; National Miller combination couplers; Westinghouse friction draft rigging; cast-iron journal boxes; malleable iron journal box lids; Pintsch light; Valentine's rubber paint; Standard steel platforms; Scott springs and Pullman vestibules.

The order for 75 cars of 60,000 lbs. capacity, and 25 coal cars of 80,000 lbs. capacity, which was mentioned in our issue of July 18 as likely to be placed in the near future, and for which specifications were given at that time, has gone to the American Car & Foundry Co. Two hundred freights are also reported building at the Laconia Car Works.

The Atchison, Topeka & Santa Fe order for 200 flat cars now being built at the Chicago works of the American Car & Foundry Co., calls for cars of 80,000 lbs. capacity, 40 ft. long, 8 ft. 6 in. wide and 3 ft. 11 in. high, to be built of wood with wooden underframes. Special equipment includes M. C. B. axles, cast-iron bolsters, cast-iron brake-shoes, Westinghouse brakes, M. C. B. brasses, Trojan couplers, Miner tandem draft rigging, plain wood dust guards, McCord malleable iron journal boxes and journal box lids, National Railway Spring Co. springs, Player trucks and A. C. & F. wheels. The 15 baggage cars now building at the Pullman works will be 60 ft. long, 9 ft. 10½ in. wide and 14 ft. 4½ in. high, to be built of wood with wooden underframes. Special equipment includes double bar iron bolsters, National hollow brake-beams, Diamond S brake-shoes, Westinghouse brakes with American slack adjuster, M. C. B. brasses, National couplers, Miner tandem draft rigging, Pintsch gas, Standard steel platforms, type B, and canvas roofs.

BRIDGE BUILDING.

ANDERSON, IND.—Otis P. Crim, County Auditor, writes that the plans are not yet made for the steel bridge over White River at Delaware street, between Anderson and North Anderson. The only action taken is the appropriation made by the County Council.

ATLANTIC CITY, N. J.—Two bridges are proposed on the turnpike between Atlantic City and Somerville at a total cost of \$10,000.

ATLANTA, GA.—The County Commissioners have decided to postpone building the proposed bridge over the Chattahoochee River at Pace's Ferry, 10 miles north-east of Atlanta, until next year.

BRANDON, MAN.—The Canadian Pacific, it is said, will build a \$25,000 overhead steel bridge between Eighth and Ninth streets.

CANTON, OHIO.—The County Commissioners are considering getting bids on the steel work for the bridge on Linden avenue over West Nimishilla Creek. Harry Hill, Commissioner.

COLUMBUS, OHIO.—The Scioto Valley Traction Co. has let a contract to the Mt. Vernon Bridge Co. for 10 bridges on its road between Lancaster and Chillicothe.

DANVILLE, ILL.—Several estimates have recently been made for the bridge proposed at West Main street. The cost of the structure has also been apportioned.

ELIZABETH, N. J.—The County of Union is considering building a steel bridge on Prince street over Elizabeth River. Address the County Engineer.

ELLENDALE, N. DAK.—Bids are wanted Oct. 6 for a steel bridge over James River. Address H. J. Oberman, County Auditor.

ELMIRA, N. Y.—The City Engineer has been ordered to consult with the State Railroad Commissioners and the State Engineer, also with the Erie R. R., in regard to plans for changing the railroad crossings at Pennsylvania avenue.

GALESBURG, ILL.—The County Board of Supervisors at its recent meeting considered the applications for a number of new bridges, some of which it will be necessary to build at once.

GRAND RAPIDS, MICH.—It has been decided not to ask bids on the Bridge street bridge until after Jan. 1, but it is proposed to let the contracts for the abutments for the Wealthy street bridge soon. There is \$100,000 available for these two bridges. L. W. Anderson, City Engineer, writes that the plans for the bridge over Grand River will be ready soon. It will be 434 ft. long, consisting of a draw span and one other span.

HARRISBURG, PA.—The Pennsylvania Steel Co. has the contract for the steel work on the new bridge over the Susquehanna River at Market street for the Harrisburg Bridge Co. The plans call for a single deck bridge, but it is said the company is considering the advisability of changing these to make the bridge double-decked. The general contractor for the work is H. S. Kerbaugh.

KANSAS CITY, KAN.—R. I. McAlpine, City Engineer, has received plans for the Tenth street viaduct which is to be built by the Chicago, Rock Island & Pacific and the Union Pacific Railroads. The viaduct will be about 1,100 ft. long and cost probably \$90,000.

LEXINGTON, MISS.—Bids are wanted Oct. 6 by the Board of Supervisors of Holmes County for removing and rebuilding a 220 ft. steel bridge. Address I. S. Harvey, at this place.

MARION, KAN.—Ira S. Sterling, County Clerk, will let contract on Oct. 9 for a bridge over Cottonwood River, east of Florence. He has the plans.

MEMPHIS, MO.—C. E. Smith, County Bridge Commissioner, writes that he will let contracts on Oct. 7 and 8 for two bridges near Memphis.

MEMPHIS, TENN.—Mr. Gould, President of the Missouri Pacific, says that his company proposes to build another bridge over the Mississippi at Memphis unless the Kansas City Bridge Co. reduces its tolls, which are considered too high.

MIDDLETOWN, PA.—The Pennsylvania R. R. and the city officers have made an agreement to eliminate the grade crossings.

MILWAUKEE, WIS.—The Chicago & North Western has agreed to build the abutments for a bridge under Bartlett street, the city to pay for the other work.

The contract for building the bascule bridge over the North Menomonee at Muskego avenue has been let to the Milwaukee Structural Co. at \$93,800.

NEW CASTLE, PA.—The Pittsburgh & Lake Erie and the Baltimore & Ohio Railroads will build overhead bridges where North Liberty and Montgomery streets are crossed.

Mr. Atwood, Chief Engineer of the Pittsburgh & Lake Erie, is making plans for a 900-ft. viaduct over Gardner avenue and the Shenango River. It will be built by the city and the local traction company, and will cost about \$100,000.

PASADENA, CAL.—The Pasadena Board of Trade has started a movement to raise money to build the bridge over the Arroyo Seco at the foot of Madeline Drive. The proposed bridge is estimated to cost \$25,000.

PAWNEE, OKLA. T.—Bids are wanted Sept. 22 for building the three bridges proposed in this county. They will cross the Arkansas River at Cleveland, Ralston and Blackburn. G. P. Moore, County Clerk.

POPLAR BLUFFS, MO.—Bids are wanted Oct. 1 for a bridge over Big Hunting Slough. B. J. Puckett, County Surveyor.

PORT DEPOSIT, MD.—The Cecil County Commissioners have let the contract to the York Bridge Co. for the bridge over Rock Run near Port Deposit.

PORTLAND, ORE.—It is said that the bridge on Grand avenue over Sullivan's Gulch, will be replaced with a steel structure. Joseph Buchtel, of the East Side Improvement Association, is actively interested.

SANDUSKY, OHIO.—The Lake Shore Electric Ry. (Cleveland, Ohio), has decided to build its own bridge over the river at Huron instead of joining with the County Commissioners in building a joint bridge.

SOMERVILLE, MASS.—It is said that bridges will be built over the railroad tracks at Sycamore and at School streets.

TORONTO, ONT.—A new steel bridge will be built over the Don at Thornhill to replace the present combination structure. Address the County Commissioners.

WEST HARTFORD, CONN.—The Town Board has ordered a new three-span concrete bridge 30 ft. wide on Fern street over Trout Brook.

Other Structures.

BURLINGTON, N. C.—The Carolina Bridge Co. has been incorporated with \$250,000 capital, of which it is said \$150,000 has been paid in. It is proposed to establish a bridge building works at Burlington. Among those interested are J. F. Murdoch, of Salisbury, N. C.; E. P. Wharton, of Greensboro, N. C., and R. W. Curtiss, of Raleigh, N. C.

CANAL DOVER, OHIO.—The Standard Motive Power Co. of New York City is reported to have secured a site at this place for its shops.

CHARLOTTESVILLE, VA.—Chas. G. Maphis, Secretary of the Chamber of Commerce, has the plans and specifications for the proposed new \$25,000 passenger station to be built at Main street, this city.

CLEVELAND, OHIO.—It is reported that the Lake Shore & Michigan Southern contemplates building a new freight station in west Cleveland.

DETROIT, MICH.—The old Pullman car shops in this city have been sold to the United Railways Co., and it is said the property will be overhauled and re-opened by the trolley company.

EASTON, MD.—The Pennsylvania contemplates building a station at the intersection of its roads in this city.

GLENWOOD SPRINGS, COLO.—The Denver & Rio Grande contemplates building a passenger station at Front street to cost \$50,000.

HUGO, IND. T.—J. F. Hinkley, Chief Engineer of the Arkansas & Choctaw, 800 Fullerton Building, St. Louis, Mo., writes that nothing definite has been decided on in regard to the new machine shops and roundhouses to be built by that company at Hugo.

JENNINGS, LA.—The Louisiana Car & Equipment Co., Ltd., has been chartered with \$150,000 capital, and will establish a general foundry and car works at Jennings. Part of the contract has already been let. J. O. Shillinglaw is General Manager.

JOHNSTOWN, PA.—The Cambria Foundry & Machine Co. is preparing to build a new and larger plant and has recently increased its capital from \$50,000 to \$150,000, and is preparing to begin work as soon as the site is selected.

MEMPHIS, TENN.—Mr. Gould, President of the Missouri Pacific, while in this place last week was reported as saying that the company stands ready to build a \$200,000 passenger station in Memphis within a short time, but he is waiting action of the other roads, which are asked to join in building a union station.

NEW ALBANY, IND.—A co-operative company has been organized at Niles, Ohio, to build a car works, and contemplates locating in New Albany. Among those interested are C. J. Packler, G. E. Pollard and G. C. Weisinger, all connected with the car works at Niles.

OAKLAND, CAL.—In order to provide increased yard room at Oakland, the Southern Pacific Co. will move the West Oakland machine shops and has now two sites for it under consideration.

PITTSBURGH, PA.—The Pennsylvania has let the contract for the metal work for the Union station trainshed to the David Lupton Sons Company, of Philadelphia. It is reported that the amount involved in the contract is \$85,000.

ROCK ISLAND, ILL.—It is said that the Tri-City Railroad Co. has decided to locate its car shops in Rock Island. J. F. Lardner, General Manager.

YORK, PA.—The plant of the Norway Iron & Steel Co. is to be extended so as to double its capacity. The present capital stock will be increased from \$300,000 to \$600,000.

MEETINGS AND ANNOUNCEMENTS.

(For dates of conventions and regular meetings of railroad associations and engineering societies see advertising page xvi.)

The American Society of Mechanical Engineers.

The next meeting of the American Society of Mechanical Engineers will take place at 12 West 31st street, New York, Dec. 2 to 5.

Society of Naval Architects and Marine Engineers.

The next, tenth, annual meeting of the Society of Naval Architects and Marine Engineers will be held at 12 West 31st street, New York, on Thursday and Friday, Nov. 20 and 21.

The Engineers' Club of Philadelphia.

A business meeting of the Club, the first fall meeting, will be held on Saturday, Sept. 20, at 8 o'clock p.m. The topical discussion will be "Depreciation as Affecting Engineered Structures," by Horatio A. Foster.

Iowa Railway Club.

On account of the meeting of Odd Fellows in Des Moines this club is unable to secure the rooms for its meeting, therefore the Executive Committee have decided to postpone the September meeting until the regular date in October.

American Society of Civil Engineers.

At the meeting of the Society, held Wednesday, Sept. 17, a paper by James N. Hazlehurst, M. Am. Soc. C. E., entitled "The Maintenance of Asphalt Streets," was presented for discussion. This paper was printed in the "Proceedings" for May, 1902.

Richmond Railroad Club.

The regular monthly meeting of the Richmond Railroad Club was held at the rooms of the Railroad Y. M. C. Association, Main Street Station, Sept. 11, at 8 p.m. The discussion was "Some Notes on Piston Valves," by Mr. F. A. Haughton, Superintendent American Locomotive Company, Richmond, Va.

New York Railroad Club.

A regular meeting of the Club was held last evening at No. 349 Madison avenue, New York. The paper of the evening was entitled "The Construction of Perfect Track," presented by Mr. J. C. Brackenridge, Chief Engineer Brooklyn Heights R. R.—both girder and T-rail work being considered. Contrary to the usual custom no advance copies of the paper have been issued.

Western Society of Engineers.

A meeting of the Society was held in its hall in The Monadnock, Chicago, Wednesday evening, Sept. 17. Mr. Geo. W. Jackson gave an address on the "Scope, Extent and Construction of the Underground Conduits of the Illinois Telephone and Telegraph Co. in Chicago," illustrated by lantern slides, and Messrs. A. E. Keith and J. F. Crook presented "The Automatic Switchboard and Telephone Combined," illustrated by working models.

Pacific Coast Railway Club.

The "Proceedings" of the meeting of Aug. 16 has been issued. The principal discussions were on (1) Air-brake slack adjusters; (2) Switch ropes, chains and jacks; (3) Should sand be washed off the rail immediately after the driving wheels have passed over it? (4) Accounting for ton mileage of switching locomotives. The discussions were mostly in the shape of letters from Messrs. Frazer, Kellogg, Goulden, Martin, Rowan, Cotter, Worthington and Sheasby.

Efforts to get a member to prepare a paper for this meeting having failed, a member read to the Club the paper on "The Superintendent, the Conductor and the Engineman," by Mr. Adams, which was published in the *Railroad Gazette* of July 18, last; and this paper is printed in the Proceedings. Following its reading there

was some discussion of the question of whether freight trains should be scheduled or should be run as extras.

The Franklin Institute.

The bulletin for the current month is:

Wednesday, Sept. 17, 8 p.m.—"The DeLaval Steam Turbine," by S. L. Sinclair, the D'Olier Engineering Company, Philadelphia. [This communication will be amply illustrated and will prove of special interest to engineers and steam users.] "A New Method and Apparatus for Stereoscopic Photomicrography," by Fred E. Ives. Discussion, "The Suppression of the Prevailing Smoke Nuisance," opened by Mr. John M. Hartman. [A number of prominent engineers and manufacturers will participate in the consideration of ways and means for mitigating the local trouble caused by the increasing consumption of soft coal within the city limits.]

Thursday, Sept. 25.—"The Ionization of Gases," by Prof. Geo. F. Stradlung.

Thursday, Oct. 2, 8 p.m.—"The Scientific and Industrial Development of Artificial Indigo," by Dr. J. McFerrit Matthews.

Thursday, Oct. 9, 8 p.m.—"Electric Fuse Protective Devices," by Mr. Joseph Sachs, Hartford, Conn.

The St. Louis Railway Club.

We learn from the Secretary, Mr. E. A. Chenery, that the opening fall meeting of this club, which was held in the Administration Building of the World's Fair, Friday, Sept. 12, was attended by nearly 300 members. Five special trolley cars took them to the fair grounds, where a luncheon was served, following which Mr. Walter B. Stevens on behalf of the Louisiana Purchase Exposition and in the absence of President Francis, welcomed the members. He was followed in turn by Mr. F. J. V. Skiff, Director of Exhibits; Mr. I. S. Taylor, Director of Works; Mr. Morris B. Gregg, Director of Concessions and Admissions, each of whom spoke of the relation the World's Fair bore to the railroads and cited figures based on past experiences as to the probable number of carloads of material, exhibits, etc., to be handled, as well as the number of people that would need to be cared for. An interesting feature was the visit of the Chinese Imperial Consul Ho Yow, of San Francisco, Cal., who being on an inspection of the World's Fair grounds in charge of representative citizens, was escorted to the club meeting and addressed the members, taking for his subject the railroads of China and the possibility for development of that and other modern enterprises such as trolley lines, electric lighting plants, etc. Congressman Bartold, of Missouri, and Mr. Jos. Flory, National Committee Secretary of the Louisiana Purchase Exposition, followed with talks in connection with the railroads and the Fair. The paper on the "Bombay Station," which was to have been presented by Mr. T. S. Blish, was deferred until the October meeting. After the meeting the members were taken on special cars over the tracks already built in the grounds and to connections with the railroads on the north and south of the grounds, passing on the way the several buildings in course of construction. As this was the first passenger train to be run over these tracks it was entirely fitting that the first passengers should be the members of the Railway Club. During the meeting a telegram was received and read announcing that Mr. Henry P. Barnard, the young man selected for the Purdue scholarship, had passed the entrance examination and had been duly admitted as a freshman in that University.

PERSONAL.

—Mr. E. L. Cothell, writing to us from Bern, Switzerland, says that his address from now until further notice will be at 1 Nassau street, New York City. It will be remembered that he has been for a considerable time in Buenos Ayres.

—Mr. George W. Beach, who recently retired from the Superintendency of the Naugatuck Division of the New York, New Haven & Hartford, after a service of over 50 years, as was announced in the *Railroad Gazette* of July 25, is not by any means removed from the business world, as he continues to hold the office of President of the Manufacturers' National Bank of Waterbury, in which city Mr. Beach has lived for many years. Moreover, we understand that he is open to engagements in the railroad field. His long experience must give him valuable qualifications as an adviser.

—Mr. William Apps, the new Master Car Builder of the Algoma Central & Hudson Bay, was for six years General Foreman of the car department of the St. Paul, Minneapolis & Manitoba, from which position he resigned to go with the Western Railway of Alabama as Master Car Builder. In October, 1891, he was appointed Master Mechanic of the Illinois Central and remained in this position until December, 1895, when he went with the Canadian Pacific as Master Car Builder, from which position he has just resigned to go with the Algoma Central & Hudson Bay.

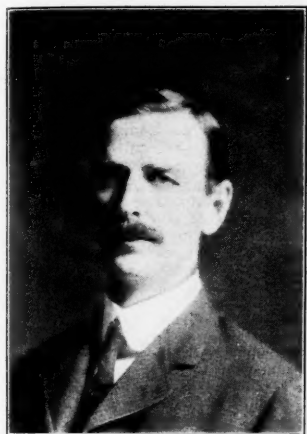
—Mr. Charles A. Paquette, Division Superintendent of the Cleveland, Cincinnati, Chicago & St. Louis, was born at Detroit, Mich., April 2, 1872, and entered railroad service in 1891, as a transitman on the Lake Shore & Michigan Southern. For one year (1892-1893) he held a similar position on the Peoria & Eastern, and for the year following was Assistant Engineer. He was then promoted to be Engineer of Maintenance of Way, and in October, 1899, was appointed Superintendent. Mr. Paquette assumed the Superintendency of the Chicago & White Water Divisions of the "Big Four" on the first of September, this year.

—Mr. H. F. Houghton, the new Assistant General Superintendent of the Cleveland, Cincinnati, Chicago & St. Louis, was born at Westminster West, Vermont, Jan. 25, 1859. At the age of 14 he entered the service of the Hannibal & St. Joseph at Palmyra, Mo., as a telegraph operator. In February, 1874, he was appointed operator at Defiance, Ohio, in the office of the Wabash (then the Toledo, Wabash & Western), where he continued for five years. In the fall of 1879, he was first promoted to an operator's desk in the train dispatcher's office at Ft. Wayne, Ind., later becoming a dispatcher in the same office. In May, 1885, he was promoted to be Chief Dispatcher at Butler, Ind., on the Detroit Division of the Wabash, acting as Trainmaster. Early in 1887 Mr. Houghton resigned this position to accept a similar one with the Baltimore & Ohio, but in the fall of 1887 he returned to the Wabash as Chief Train Dispatcher. In December, 1890, he became Trainmaster on the same division. This position he held until Aug. 1, 1893, when he resigned to go with the "Big Four" as Assistant Superintendent of the Chicago Division, later becoming Superintendent of the same division.

—Mr. George C. Fisk, President of the Wason Manu-

facturing Company of Springfield, Mass., has just completed 50 years' service with that concern, and on September 8 the officers and employees of the shops celebrated the event by flying a new flag, properly inscribed, over the buildings, and by giving Mr. Fisk a beautiful album containing their portraits and other photographs. Mr. Fisk is now 71 years old, but is much younger than would appear from the almanac. He was born in Hinsdale, N. H. He began working for Thomas W. Wason when the car shop was a small affair. In 1853 Mr. Fisk became a partner, and in 1863, on the enlargement of the company, he was made Treasurer. He became Vice-President in 1869, and President in 1871, on the death of Mr. Wason. The Wason car shop is one of the best known railroad establishments in the world, cars having been made there for Egypt and other foreign countries more than forty years ago. Its products are to be seen on numerous roads in South America. It built a large part of the original equipment of the Central Pacific. In its first year the Wason shop made six single-truck and two double-truck freight cars, and the shed which answered for a shop was not large enough to house an entire freight car. Now the company builds 400 cars a year and employs 575 men.

—Mr. W. S. Kinnear, who recently succeeded Mr. Torrey, as Chief Engineer of the Michigan Central, is 38 years of age. He began railroad work in 1884 as an axman with the Atchison, Topeka & Santa Fe, and has been engaged since that time as rodman, draftsman and transitman on the Southern Kansas and rodman and Assistant Engineer for the Kansas City, Clinton & Springfield. For one year he was Assistant Engineer of Maintenance of Way on the Missouri Pacific at Kansas City, but resigned to go with the Gulf, Colorado & Santa Fe as a Division Engineer. For two years he practiced civil engineering at Los Angeles, Cal. Mr. Kinnear then went with the North & South American Construction



Company as office Engineer, Assistant Chief Engineer and Acting Chief Engineer at Santiago, Chile. In 1890 he went with the Michigan Central as Assistant Engineer of Maintenance of Way, remaining there five years, at the end of which time he took the position of Supervising Engineer of Construction on the Toledo, Hamilton & Buffalo. In January, 1896, he returned to the Michigan Central as Principal Assistant Engineer at Detroit, Mich., being promoted in October, last year, to Assistant Engineer of the Canada Division, and for two months held the Assistant General Superintendency. Mr. Kinnear's appointment as Chief Engineer took effect Aug. 25, last.

ELECTIONS AND APPOINTMENTS.

Ann Arbor (Wabash).—At a meeting of the Directors of this company held Sept. 15, Joseph Ramsey, Jr., (President of the Wabash), was elected President, succeeding W. R. Burt; Cyrus J. Lawrence was elected Vice-President; D. C. Tate, Secretary, and H. B. Henson, Treasurer.

Atchison, Topeka & Santa Fe.—G. Lindoff has been appointed General Foreman, with headquarters at Argentine, Kan., succeeding A. J. Fitzgerald, resigned.

Baltimore & Ohio.—A. H. Thomas has been appointed Assistant to the General Superintendent of Motive Power, with headquarters at Baltimore.

Canadian Pacific.—D. Bell and W. A. Brown have been appointed Division Superintendents, with headquarters at Moose Jaw, N. W. T., and Broadview, N. W. T., respectively. C. W. Milestone, Division Superintendent (Western Division) has resigned.

Chicago & North Western.—H. T. Bentley, Master Mechanic of the Iowa Division at Clinton, Iowa, has been appointed Assistant Superintendent of Motive Power and Machinery, with headquarters at Chicago, Ill. Frank G. Benjamin, Master Mechanic at Baraboo, Wis., has been appointed Master Mechanic of the Iowa Division, succeeding Mr. Bentley, and W. H. Huffman, Division Foreman, succeeds Mr. Benjamin as Master Mechanic at Baraboo.

Chicago & Southeastern.—A. Stevens, Traffic Manager, with headquarters at Muncie, Ind., has resigned.

Chicago Great Western.—E. P. Mobley, heretofore Roadmaster, has been appointed Division Engineer of the Southwest Division, with headquarters at Des Moines, Iowa, succeeding W. B. Causey, resigned.

Chicago, Rock Island & Pacific.—F. C. Smith, Division Superintendent, with headquarters at Colorado Springs, Colo., has resigned. (See Colorado Springs & Cripple Creek District.)

Chicago, Rock Island & Texas.—Henry Morris has been appointed Acting Auditor, with headquarters at Fort Worth, Texas, and F. E. Mitchell becomes Treasurer.

Choctaw, Oklahoma & Gulf (C. R. I. & P.).—J. S. McNally has been appointed General Passenger Agent, with headquarters at Oklahoma City, Okla. T., succeeding George H. Lee, resigned.

Colorado Springs & Cripple Creek District.—F. C. Smith, heretofore Division Superintendent of the Chicago, Rock Island & Pacific, has been appointed General Superintendent of the C. S. & C. C. D., with headquarters at Colorado Springs. A. C. Ridgway, General Manager, has resigned and the office has been abolished.

Delaware Valley.—M. Yetter has been elected President. C. H. Rutter, Auditor, Purchasing Agent and General Freight and Passenger Agent, with headquarters at Easton, Pa., has resigned. M. Evans will assume the duties, temporarily, formerly discharged by Mr. Rutter.

Eric.—A. W. Ball, Division Master Mechanic, with headquarters at Galion, Ohio, has resigned.

Kentucky & Indiana Bridge.—T. H. Hayden has been appointed Acting Manager, succeeding B. S. Josselyn, Manager, resigned, effective Sept. 16.

Little Kanawha.—See Zanesville, Marietta & Parkersburg.

Mobile, Jackson & Kansas City.—G. R. Rogers has been appointed Auditor, with headquarters at Mobile, Ala.

New York Central & Hudson River.—C. E. Webster, Principal Assistant Engineer, with headquarters at Syracuse, N. Y., has resigned and that position has been abolished.

Pennsylvania.—W. F. Keisel, Jr., has been appointed Assistant Mechanical Engineer, with headquarters at Altoona, Pa., succeeding A. W. Gibbs.

Pittsburgh, Carnegie & Western (Wabash).—W. D. Holliday, Assistant General Freight Agent at Pittsburgh, Pa., of the Wabash, has been appointed Traffic Manager of the P., C. & W.

Rutland.—S. S. Colton has been appointed Superintendent, with headquarters at Rutland, Vt.

St. Louis & Gulf.—L. B. Houck, President, with headquarters at Cape Girardeau, Mo., has resigned.

Southern.—J. A. Dodson has been appointed Assistant to the General Manager, with headquarters at Washington, D. C., succeeding C. S. McManus, who has become General Superintendent of the Western District, with headquarters at Chattanooga, Tenn., succeeding Mr. Dodson, effective Sept. 15.

Southern Pacific.—A. F. Roome has been appointed Superintendent of Telegraph, with headquarters at San Francisco, Cal.

Warren & Corsicana Pacific.—T. D. Hathaway has been appointed Auditor, with headquarters at Warren, Texas, succeeding W. J. Spurlock, Acting Auditor, who has been assigned to other duties. The general offices of this company have been removed from Houston to Warren.

Washington County.—O. J. Cherry, heretofore Car Accountant, has been appointed Purchasing Agent, with headquarters at Calais, Me.

Zanesville, Marietta & Parkersburg.—In addition to his duties as Chief Engineer of The Little Kanawha Railroad, Samuel D. Brady has been appointed Chief Engineer of the Zanesville, Marietta & Parkersburg Railroad Company, with office at Parkersburg, W. Va. R. P. Van Deusen is appointed Assistant Chief Engineer of the Little Kanawha and the Zanesville, Marietta & Parkersburg Railroad Companies, with office at Parkersburg, W. Va. Appointments effective Sept. 15.

RAILROAD CONSTRUCTION.

New Incorporations, Surveys, Etc.

ALPENA & WEST MICHIGAN.—It is said that grading will begin shortly on the projected line between Alpena and Charlevoix, Mich., 120 miles.

ATCHISON, TOPEKA & SANTA FE.—Extension of the Cushing Branch of the Oklahoma Division from Cushing, Okla. T., eastward to Avery, seven miles, is reported.

CANADIAN PACIFIC.—An officer writes in regard to the reports that large sums of money are to be spent on betterments next year, that no details have as yet been arranged, although considerable work is planned.

CAPE PEAR & NORTHERN.—According to most recent advices in regard to the extension of this line now in operation between Apex, N. C., and Angier, 20 miles, four miles out of Angier in Harnett County have been completed, on the route to Smiley's Falls on the Cape Fear River, and the other nine miles of line to the Falls have been located. A large cotton mill is now building at Smiley's Falls. (June 6, p. 421.)

CAROLINA & WESTERN.—Work is reported in progress on this new line, which is being built from Fechtig, S. C., on the line of the Charleston & Western Carolina to a point on the Carolina Midland near Tillman, S. C., about 25 miles. Permission to build was granted last July. W. F. Cummings, of Hampton, S. C., is President.

CARROLLTON SHORT LINE.—An officer is quoted as saying that this line, now in operation between Carrollton and Reform, Ala., where a connection is made with the Mobile & Ohio, will be extended to Bridgeville in Pickens County, at once. The distance is about 12 miles, and part of the grading has been done already. The present length of the line is 10 miles.

CENTRAL OF GEORGIA.—It is said that options have been secured on a large tract of coal land near Leeds, Ala., and that a branch line 25 miles long will be built to reach the property.

CHESAPEAKE & OHIO.—An officer writes that preliminary surveys have been completed, and final location is now being made on a road to be built under the Chesapeake & Ohio charter as an extension of the White Oak branch to the mines of the Stuart colliery. The line begins at Carlisle, W. Va., and the White Oak branch is left by means of a switchback, with a maximum grade, with loads of 2.5 per cent., and against loads of 1.5 per cent., and maximum curvature of 12 deg., uncompensated. There are no bridges, trestles or tunnels. Contract will be let as soon as surveys are completed, which will be in about 30 days. C. W. Johns, of Scarbro, W. Va., is Chief Engineer of the White Oak Fuel Co., which is building the road. (Aug. 22, p. 664.)

CHICAGO & EASTERN ILLINOIS.—New line from Milford Junction, Ill., to Freeland, Ind., 11 miles. See under Railroad News.

CHICAGO & NORTH WESTERN.—The Fremont, Elkhorn & Missouri Valley line, which was opened for traffic from Verdigris, Neb., to Niobrara, 11 miles, last July, was opened Sept. 9 to Lynch, Neb., about 22 miles beyond. See under Fremont, Elkhorn & Missouri Valley, July 4, p. 543.

CHICAGO, BURLINGTON & QUINCY.—Several contracts have been let to grade the new double-track through Mills County, Iowa. Contract for one section has been let to Harry Hall, and for others to Flick & Johnson. The work involves some heavy grading, a large fill, a crossing of Wabash tracks and undergrade crossings for wagon roads, and it is said that grading will begin in a few days.

CHICAGO GREAT WESTERN.—The extension from Hampton to Clarion, Iowa, 26 miles, was put in operation Sept. 15.

CHIPPewa RIVER & NORTHERN.—This company has been incorporated in Wisconsin to build in a general northerly direction from Apollonia, 24 miles north of Madison. The incorporators are Wm. A. Phipps, David Humbird and others.

CINCINNATI, GEORGETOWN & PORTSMOUTH.—Work is reported in progress by a large force changing the grade between Bethel and Georgetown, Ohio, to standard gage. At present the road operates 39 miles of narrow gage, and three miles of standard gage between Cincinnati and Georgetown, Ohio, and when the entire line has been

made standard, it will be operated by electricity instead of steam, as at present. (July 4, p. 543.)

DELAWARE & HUDSON.—An officer writes that the company will put the lines of the Chateaugay R. R. in first-rate condition and have it ready for next season's business as a standard gage road. The Chateaugay extends from Plattsburg, N. Y., to Lake Placid, a distance of 83 miles.

DENVER, NORTHWESTERN & PACIFIC.—Ground was broken in a number of places in Colorado on Sept. 1 for the new Moffat Road, in accordance with the contract previously made with the Colorado-Utah Construction Co., which will do the building. (Sept. 5, p. 635.)

FLORIDA EAST COAST.—The surveying corps which has been working on this new line in Florida, returned from the Everglades on Sept. 9. The route laid out by them is approximately the shape of a letter U, and runs from Miami south to the Easterling purchase, then west to the Everglades and northwest through them to a point west of Miami. It is said that the line will eventually be extended to the lower end of Florida, and will cross by trestle between the islands to Key West.

FORT SMITH & WESTERN.—Extension is reported completed from McCurtain, Ind. T., west to Crowder City, Ind. T., 43 miles. This is a new line which was reported completed from Fort Smith and Western Junction, below Fort Smith, Ark., to McCurtain, 20 miles west, last July, and it is projected to Guthrie, Okla. T., 173 miles from Fort Smith & Western Junction. (July 11, p. 561.)

FREDERICKSBURG, CULPEPER & RAPPAHANNOCK.—According to most recent advices, preliminary surveys for this projected line from Fredericksburg, Va., to Deepwater, on the Potomac River, have been completed, passing through Culpeper, Rappahannock and Stafford Counties by way of Falmouth. The grades are reported to be easy and the curvature slight, and it is said that grading will be commenced shortly. A branch from a point on the main line near Hartford, in Stafford County, is also projected to run north to Quantico or Manassas on the Southern. (Sept. 5, p. 696.)

GREAT NORTHERN.—Extension of the Jennings Branch of the Kalispell Division from Jennings, Mont., eastward to Gateway, 52 miles, has been completed.

ILLINOIS CENTRAL.—An officer denies current press reports that work is to be begun in the near future on the line between Vaughan and Howard, in Yazoo County, Miss.

INTERCOLONIAL.—Contract to build the projected branch line from Riviere Ouelle, Kamouraska County, Que., to St. Denis Wharf, on the St. Lawrence, six miles, has been let to Falcon & Purcell, of Cornwall, Ont. (Aug. 1, p. 616.)

INTERURBAN ELECTRIC (IOWA).—The first half of this line between Des Moines and Altoona, Iowa, 10 miles, was put in operation Sept. 12. Grading has almost been completed on the second half to Colfax, about 10 miles additional, and it is hoped that the entire line will be ready for traffic by the first of November. (March 28, p. 235.)

IOWA TRACTION.—Amended articles of incorporation of the Dubuque & Pacific were filed with the Secretary of State of Iowa Sept. 9, changing the name to the Iowa Traction Co. The Dubuque & Pacific was organized in 1896 to build a steam railroad with terminals at Dubuque. Nothing ever came of the project, and recently the directors decided to change the name of the company and to build an electric line from Dubuque southwest to the Chicago & North Western. It is the intention of the company to build the line at once.

LAKE SUPERIOR & ROCKY MOUNTAIN NAVIGATION.—Notice is given of application to the Canadian Parliament for an act of incorporation of a system of canals to run from some point on Lake Superior to the Lake of the Woods by way of Rainy River, and from the Lake of the Woods to the Red River; thence along Red River and other waterways to Cedar Lake on the Saskatchewan River, and from thence into Alberta to a point at or near Calgary and to other points. McLeod Stewart, of Ottawa, is solicitor for the applicants.

LARAMIE, HAHN'S PEAK & PACIFIC.—The grade of this projected line from Laramie, Wyo., by way of Centennial west, is now reported to be making rapid progress for a distance of 75 miles, but track laying will probably be delayed until spring. The road is being built on a common stock basis, with no preferred stock or bonds. Isaac Van Horn, 7 Congress street, Boston, Mass., is President. (May 30, p. 404.)

LOUISVILLE & ATLANTIC.—According to most recent reports, the new line between Miller's Creek, Ky., and Beattyville, 27 miles, will be in operation early in October. Track laying began March 1 under contract to the Mason & Hoge Co., of Frankfort, Ky.

LOUISVILLE & NASHVILLE.—It is reported that the Providence branch, which now terminates at Providence, Ky., will be extended to Shawneetown, Ill., about 40 miles distant. The line, if built, would pass through a very rich mineral and timber country and would make the route to St. Louis over the Louisville & Nashville about 25 miles shorter than at present.

MEDFORD, RED FORK & WESTERN.—An officer writes that this is the correct name of the company referred to in our issue of Aug. 29 as the Dumas-Medford. The section between Dumas and Medford, Ark., eight miles north and south, is to be built at once and contracts will be let between Sept. 20 and Sept. 30. The contractors have been partially agreed upon but their names are not given. The character of the work is easy, with no curves or hills. The company is now in the market for about 10 miles of relay rails. It is not stated when the remainder of the line east from Medford to Red Fork, about five miles additional, will be contracted for. Franklin Bros. & Co., Little Rock, Ark., may be addressed.

MEXICAN INTERNATIONAL.—Surveys are reported for a branch line from Porfirio Diaz, opposite Eagle Pass, Texas, through the Rio Grande Valley to Las Vacas, and opposite Del Rio, Texas, a distance of about 75 miles.

MEXICAN NATIONAL.—Work is reported practically completed on widening the line to standard gage between Laredo, Texas, and Monterey, a distance of about 150 miles, and it is said that service over the new gage will be inaugurated about the first of October. The standard gaging between Monterey and Saltillo, 65 miles south, will be completed soon afterwards. (June 27, p. 520.)

MINNEAPOLIS, ST. PAUL & SAULT STE. MARIE.—An officer denies the current press reports that an extension will be built from Gravenhurst to Sault Ste. Marie by way of the French River. (See under Sault Ste. Marie.)

MISSOURI PACIFIC.—President Gould is quoted as saying: "We will build a \$200,000 passenger station in Memphis within a short time. We would like the other roads entering here to join us and erect a union station, but if they will not do so, we stand ready to undertake

this work single handed. We also purpose to build another bridge across the Mississippi here unless the Kansas City Bridge Co. reduces its tolls. The Union Belt property, controlling interest in which was recently purchased by the Missouri Pacific, is susceptible of very high development and cost will be no object in the improvement of this property. Contracts will be let in a short time and the work will be pushed as rapidly as possible.

The road projected from Wynne, Ark., to Kansas City by way of Buffalo City, Mo., will be extended to Memphis instead of ending at Wynne as previously announced. The distance from Wynne to Memphis is 35 miles.

MOYER-INDIAN CREEK.—Surveys are reported for a new line from Moyer Station, Pa., on the southwest branch of the Pennsylvania R. R., near Connellsville, up Spruce Creek to Indian Creek, nine miles, to open up timber and mineral country. The road is in charge of Joseph Anderson, of Pittsburgh, Pa., and surveys are being made by John L. Hengstler, of Scottsdale, Pa.

NEW WESTMINSTER, VANCOUVER NORTHERN & YUKON.—New surveys for the final location of this line, previously reported as the Vancouver Northern & Yukon, are now being made, and it is said that work will begin on the grade at both ends as soon as the surveys are completed. It is proposed to build north from Vancouver, B. C., by way of Quesnelle and Hazelton to the boundary line of the province, with several branches. John Hendry is President.

NORFOLK & WESTERN.—Surveys are reported for a new branch line to connect the East Lynn coal fields near Huntington, W. Va., with this company. The coal lands reported to have been recently sold to A. J. Prichard, of Birmingham, Ala.

NORTH & SOUTH CENTRAL.—This company was incorporated in Missouri Sept. 8 to build a railroad 25 miles long through the counties of Camden and Laclede from a point at or near Lebanon on the St. Louis & San Francisco, to a point on the Niangua River at or near Linn Creek in Camden County. The headquarters of the company will be at Hahatonka, Mo., and the incorporators are R. G. Scott, Joseph R. Orwig and others.

NORTHERN PACIFIC.—Extension of the Sykeston Branch of the Dakota Division from Bowdon to Denhoff, N. Dak., 27 miles, has been completed.

OKLAHOMA CENTRAL.—A territorial charter was granted this company on Sept. 9 to build from Fort Smith, Ark., to Vernon, Texas, through the Choctaw, Creek, Seminole and Chickasaw nations, and through the counties in Oklahoma of Cleveland, Pottawatomie and Comanche, an estimated length of 350 miles. The incorporators are L. W. Van Horn, of Salt Lake City; J. N. Cook, of Elk City; Geo. Boggs, of Asher, Okla. T. The headquarters of the company will be at Asher.

ONEONTA, COOPERSTOWN & RICHFIELD SPRINGS (ELECTRIC).—This new electric line, operating in northern New York State, was opened throughout the 22 miles of its present length on Sept. 6. H. T. Jennings, of New York, is Treasurer. (March 21, p. 218.)

PARRAL & DURANGO.—An extension of the main line from Ojito, Mexico, to Llano Blanco, six miles, is reported. Sixteen miles was built during 1901 in the states of Chihuahua and Durango.

PARSONS-CLOVER RUN.—The Clover Run Lumber Co. has graded 3½ miles of the 6½ miles between these two points and will complete the road between them to be used for lumber and coal. Robert B. Ferree is President, and G. M. Cote, Parsons, W. Va., is Superintendent.

RALEIGH & WESTERN.—An officer writes in regard to a projected extension from Harper's Cross Roads, N. C., to Rameur, that the line is now in operation between Colon, on the Seaboard Air Line, and the Chatham Coal & Iron Co. mines at Cummock, N. C. About nine years ago an extension of 15 miles between Cummock and Harper's Cross Roads was graded but no track laid, and this old roadbed is now being repaired and will be used for the new line. The general direction of the proposed extension is west. The engineers are engaged on preliminary and location work between Harper's Cross Roads and Randleman, and experimental lines are also to be run from Randleman to Greensboro and Winston. The surveys are not yet sufficiently under way to make estimates or let contracts, which will probably be done next spring. The work will be easy and the total length of the projected line, when completed, will be about 125 miles. Traffic will include coal, timber, cotton, etc. Samuel A. Henszey, of New York, is President, and Geo. C. MacGregor, of Cummock, N. C., is Chief Engineer.

RIO GRANDE WESTERN.—It is said that the Salina cut-off in Utah will be built from Salina, on the Sevier Branch, to Green River, on the main line, a distance of about 115 miles. Twenty miles out of Salina were graded in the early part of the summer and surveys have been made for the entire distance. The new route will save some considerable distance between Denver and Los Angeles, and will have a maximum grade of 2.5 per cent. in place of the present 4 per cent. grades of Soldier's Summit. (May 2, p. 336.)

SALT LAKE & COOS BAY.—Surveys are reported in progress for this projected line between Coos Bay, on the Pacific Coast in Oregon, and Grant's Pass, Josephine County, about 80 miles southeast. The engineers in the field are said to have chosen Middle Fork Pass in the Cascade mountain, as the best route. L. V. Kinney, of Portland, Ore., is interested. (July 11, p. 561.)

SAULT STE. MARIE.—This company has been reorganized in Ontario and will apply to the next session of Parliament for re-incorporation, with all the privileges and powers granted under previous acts of incorporation. The intention is to build from Gravenhurst to Sault Ste. Marie by way of the French River and lateral branches, and also to build a branch line to Lake Temiskaming, etc. The proposed total distance is 400 miles or more. John Bell, previously Solicitor for the Grand Trunk, is Solicitor for the Sault Ste. Marie Co.

SOUTHERN.—It is said that surveys are to be made for a branch line from Ivy, Tenn., near Oliver Springs, out into coal fields in that vicinity.

SOUTHERN PACIFIC.—According to most recent advices, track has now been laid on the Ogdén-Lucín cut-off for about 17 miles west from Ogdén, which brings the work well out into the lake. Grading is now in progress on the Desert section from Lucín to the west shore of the lake. The alignment is almost a tangent, varying but 26 ft. from the air line distance, which is nearly 60 miles.

Rebuilding of the line between Oakland and Port Costa, Cal., 25 miles, has reached a point a short distance north of Oleum. The work includes entire relaying with new ties and rails and general betterment.

STANLEY, MERRILL & PHILLIPS.—Grading is reported begun on a 15-mile line with this name to connect Stanley, Wis., with the new branch of the Chicago & North Western now being built east from Chippewa Falls, mid-

way between the Wisconsin Central and the Minneapolis, St. Paul & Sault Ste. Marie lines. Winston & Hill are the contractors.

SUFFOLK & CAROLINA.—This line, previously in operation between Suffolk, Va., and Mavaton, N. C., 41 miles, has been extended from its southern terminus to Edenton, N. C., 10 miles. Projected improvements to be carried out in the near future also include an extension to Elizabeth City, N. C., about 30 miles, and broad gaging of the present line. W. H. Bosley, of Baltimore, is President. (July 4, p. 544.)

TEMISKAMING & NORTHERN ONTARIO.—Sealed tenders will be received until Saturday, Sept. 27, to build this projected line for the Ontario Government, including clearing of right of way, bridging, grading, ballasting and track laying from the town of North Bay, Ont., to a point on Lake Temiskaming, 110 miles distant, more or less. Plans and specifications may be seen, and full information obtained from the Chief Engineer at North Bay. A check for \$25,000 must accompany each tender. P. E. Ryan, Toronto, Ont., may be addressed. (See under Temiskaming & North Bay, Aug. 22, p. 664.)

TENNESSEE ROADS.—Preliminary surveys are reported completed for a road to be built by the Smoky Mountain Timber & Improvement Co. from Maryville to the mountains in Monroe County, Tenn., along Citico Creek. The road will be 24 miles long, reaching a rich timber region. John Carpenter is President of the Timber & Improvement Co., and may be addressed at Memphis, Tenn.

The Little River Lumber Co. is said to have practically completed a line 11 miles long from Walland, Tenn., to its mill sites on the Little River. J. J. Condon is contractor.

TEXAS & LOUISIANA.—The new line between Lufkin and Monterey, Texas, was reported opened for business on Sept. 2. Monterey is 23 miles east of Lufkin. (May 30, p. 404.)

TRANS-CANADA.—Tenders will be called for in a few days for the first few sections of this projected line, which it is proposed to build north of the Canadian Pacific, tapping James Bay and touching Lake Winnipeg. The ultimate destination of the line as projected is at Port Simpson, on the Pacific coast. The work to be done at the present time will begin at the northwest of Lake St. John, Que. Application was made to the Canadian Parliament last April. (April 11, p. 278.)

YAKIMA VALLEY CENTRAL (ELECTRIC).—Articles of incorporation for this company have been filed with the Auditor of Yakima County, Wash. Surveys are reported completed and the right of way secured for an electric line from North Yakima, Wash., to Sunnyside and beyond. The distance from North Yakima to Sunnyside is about 32 miles. The company was organized last summer and has ambitious plans for the future, including the continuance of their line for 100 miles, the building of power plants, etc. J. F. McNaught, of North Yakima, is General Manager. (Aug. 1, p. 616.)

GENERAL RAILROAD NEWS.

AMERICAN-CHINA DEVELOPMENT.—An officer confirms the recent reports that a line to be known as the American-Asiatic S. S. Co. has been organized to run between New York and Chinese ports, and adds that steamers will be run regularly, and that the same parties who are interested in the company are also interested in the American railroad concession in China, and it is therefore expected that there will be a close affiliation between the two companies. Wm. Barclay Parsons, of New York, is President.

BALTIMORE & OHIO.—On Sept. 11 the directors authorized an increase in the common stock from \$100,000 to \$125,000,000. The new shares, together with about \$17,500,000 shares of common stock now in the treasury and available, are offered at par between Oct. 17 and 24, 1902, to holders of common and preferred stock to the extent of 30 per cent. of their holdings, as registered at noon on Sept. 27. The purposes of the increase include \$20,000,000 to be applied for new equipment and equipment already acquired; \$4,000,000 to double-track the line between New Castle and Akron, Ohio; \$10,000,000 for stocks, bonds, etc., acquired and to be acquired under what is known as the Pittsburgh, Lake Erie & West Virginia plan and placed under that mortgage, and \$8,500,000 for new yards and new construction. The privilege is also extended to holders of the convertible 4 per cent. debentures to convert the same into common stock on or before Sept. 27. There are about \$5,450,000 of these outstanding. Holders of common stock issued for such debentures will participate in the privilege of subscribing to the issue of common stock covered by the company's circular of Sept. 11.

CHICAGO & EASTERN ILLINOIS.—Additional general consolidated 5 per cent. bonds of 1937 have been listed by the New York Stock Exchange to the extent of \$657,000. Additional common stock to the extent of \$20,000 has also been listed. This brings the total issue of bonds to \$13,643,000, and of common stock to \$7,217,800. The new bonds provide for equipment and 11 miles of new line between Milford Junction, Ill., and Freeland, Ind.

CHICAGO, MILWAUKEE & ST. PAUL.—At a meeting of the directors on Sept. 11, the dividend on the common stock was raised to 7 per cent. per annum, and an extra dividend of one-half of 1 per cent. was declared. The previous semi-annual dividend was 3 per cent.

CHIPPEWA RIVER & MENOMONIE.—This line, previously owned by the Chippewa Lumber & Boom Co., has been sold jointly to the Minneapolis, St. Paul & Sault Ste. Marie and the Beldenville Lumber Co. The line is 34 miles long, running between Chippewa Landing, Wis., and Apollonia, where connection is made with the former railroad, which takes over the first 13 miles of the line. The Beldenville Company takes the remaining 21 miles. It is said that the road will be worked as a logging road for the next two years, after which it will be put in shape for general traffic. Edward Johnson, of Apollonia, has been appointed Superintendent under the new management.

CONNECTICUT RIVER (BOSTON & MAINE).—The shareholders will meet on Sept. 17, at which time a vote will be taken on the proposition to issue \$969,000 bonds to provide funds to redeem the company's interest bearing scrip, of which \$1,290,000 was issued in 1893, bearing 4 per cent. interest and payable Jan. 1, 1903, in cash or bonds. The available funds on hand will pay for a portion of the scrip to be redeemed. The Connecticut River R. R. runs from Springfield, Mass., to Keene, N. H., with branches which bring the total mileage to 80 miles, and is leased to the Boston & Maine for 99 years from Jan. 1, 1893. Fifty thousand

dollars additional capital stock and \$290,000 3½ per cent. 20-year bonds were issued in January, 1901, to discharge floating debt.

COLORADO & SOUTHERN.—The annual report covering the operations to June 30 last is the third issued by the present company. Dividends have been paid on the first preferred shares in each of the three fiscal years; the dividends having been started at 2 per cent. in 1900; increased to 3 per cent. late in 1901, that rate being charged against 1902 earnings, while within the last month the full 4 per cent. rate payable on these preferred shares has been established. The income account is summarized in the following table:

	1902.	1901.
Gross earnings	\$5,580,327	\$4,794,649
Operating expenses	4,044,245	3,507,870
Operating expenses and taxes	4,263,482	3,712,301
Net earnings	1,316,845	1,082,348
Total net income	1,357,275	1,124,524
Fixed charges	730,517	718,876
Surplus	\$626,758	\$405,648
First pref. stock dividends paid in fiscal year	*255,000	†170,000
Balance	\$371,758	\$235,648

*Three per cent. †Two per cent.

The reports of the company contain a number of unusual features and statistics not commonly found in the reports of the larger companies, one of the most interesting of these being the statement of classified tonnage which not only gives in detail the number of tons of each class of traffic carried but the amount of freight originating on the company's own line and on other roads and the revenues so derived, as well as the receipts from each class of traffic, with the percentages in tonnage and in revenues to the totals worked out. The results are from a mixed system of standard and narrow gage line, the company working 734 miles of standard gage, and 387 miles of narrow gage, or 1,121 miles altogether.

DETROIT UNITED (ELECTRIC).—Warren, Andrews & Co., of New York, offer at 101 and interest \$500,000 first consolidated mortgage gold 5's of the Detroit & Flint, secured by mortgage lien on about 85 miles of road, and guaranteed principal and interest by endorsement of the Detroit United. First consolidated gold 4½ per cent. bonds of the Detroit United have also been deposited with the Guaranty Trust Co. of New York as additional collateral security. Gross earnings of the Detroit United for the year ending Dec. 31, 1901, were \$2,919,171, and net income was \$1,345,473. After deducting interest on funded debt, there remain as surplus applicable to dividends, \$670,129. Based on the results for the first six months of the present year, an increase of over \$500,000 in gross earnings is expected at the close of the year.

GLADEVILLE.—The name of this road, which now extends from Gladeville to Wise, Va., 3½ miles, has been changed to the Virginia & Kentucky.

INTERBOROUGH RAPID TRANSIT.—Certificate of increase in the capital stock from \$25,000,000 to \$35,000,000 has been filed at Albany to provide for equipment of the Rapid Transit road to be operated in the New York subways. (Aug. 29, p. 682.)

MISSOURI PACIFIC.—Additional capital stock to the amount of \$1,400,000 has been listed by the New York Stock Exchange. This makes a total listed of \$77,450,200 out of the total authorized to be listed, \$77,531,000. The new issue covers income expenditure on 47 miles of additional main track mileage recently built between Boonville, Mo., and Jefferson City, together with certain other short extensions, spur tracks, etc.

PANAMA R. R.—Notice is given that 153 6 per cent. sinking fund subsidiary bonds were drawn for redemption Sept. 8, and will be redeemed Nov. 1 at the office of the company, after which time interest upon them will cease.

PITTSBURGH, CINCINNATI, CHICAGO & ST. LOUIS.—Sealed proposals to buy consolidated mortgage bonds to the amount of \$403,970 will be received at the New York Agency Co. on or before Oct. 1. Bonds offered at the lowest price, but not exceeding par, will be accepted and paid for by the Farmers' Loan & Trust Co., agents.

NORFOLK & WESTERN.—At a meeting of shareholders Oct. 9 a vote will be taken to ratify the acquisition of the capital stock of the Pocahontas Coal & Coke Co., and the issue of joint bonds with that company. Approval of building a branch road along the Big Sandy, as previously described in the *Railroad Gazette*, will also come up at that time, together with a vote to acquire property and franchises of the Iaeger & Southern, Southwest Virginia and Kenova & Big Sandy railroads, and of the Radford Southern R. R. & Mining Co. This last has been graded for five miles and is projected from a connection with the main line at Radford, Va., to mineral properties on the New and the Little New Rivers.

NORTHERN PACIFIC.—The Washington & Oregon, which has recently been built between Kalama, Wash., and Vancouver, along the Columbia River, went into the management and control of the above company on the first of September and will hereafter be known and worked as a direct branch of the Northern Pacific. The road was reported completed last April and application was made to Congress for permission to bridge the Columbia River at Vancouver, with the intention of extending the branch from Vancouver to Portland, Ore. Newman Kline, of Tacoma, Wash., succeeds Edmund Rice as Secretary, Manager and Superintendent. (April 25, p. 316.)

WESTERN MARYLAND.—Announcement is made that shareholders will meet Oct. 14 to authorize a mortgage to the Mercantile Trust Co., of New York, trustee, to secure \$50,000,000 4 per cent. 50-year bonds without right of earlier redemption. The bonds cover not only the Western Maryland and its proprietary and leased lines, but also 98 per cent. of the \$11,000,000 stock of the West Virginia Central & Pittsburgh, which includes the Davis Coal & Coke Co. Of these bonds \$25,000,000 are to be issued at once, and these have been underwritten by a syndicate formed of Vermilye & Co. and Geo. P. Butler & Bro., of New York, and their proceeds will be used to build terminals in Baltimore, rebuild the line generally and build an extension 65 miles long from Cherry Run, W. Va., to a connection with the West Virginia Central & Pittsburgh at Cumberland, Md. The sum also provides a sufficient amount to equip the new connection. The remainder of the issue is reserved to pay off at maturity the underlying bonds of both companies, aggregating about \$7,500,000, and to add to and develop the two properties, including their proprietary companies. An increase in common stock in the amount of \$685,400 is also to be authorized. The common stock, when so increased, will consist of 1,200,000 shares of a par value of \$50 each.